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**SUSTAINABLE AGRICULTURAL
MANAGEMENT AND LANDSCAPING
THROUGH
AGROFORESTRY AND PERMACULTURE
CASE STUDY: NORTHERN MALTA**

**SUSTAINABLE AGRICULTURAL
MANAGEMENT AND LANDSCAPING
THROUGH
AGROFORESTRY AND PERMACULTURE**

CASE STUDY: NORTHERN MALTA

**A dissertation presented in part fulfilment of the requirements for the
Degree of Master of Science in Sustainable Environmental Resource
Management/ Master of Science in Integrated Science & Technology**

SHAWN VELLA

NOVEMBER 2010

Supervisors: Dr. L.F. Cassar, Dr. A. Sacco, Dr. W. Teel

**UNIVERSITY OF MALTA - JAMES MADISON
UNIVERSITY**

ABSTRACT

Shawn Vella

Sustainable Agricultural Management and Landscaping through Agroforestry and Permaculture. Case Study: Northern Malta

The farming industry in Malta is facing severe challenges. Many small patches of arable land are being abandoned following land use conflicts and competition from foreign agricultural products. This reduces the economic capacity of the farming industry which leads to soil erosion and land degradation. On the other hand, the remaining land is being intensively farmed with the use of chemical fertilisers and pesticides. Local government following EU regulations is trying to change this trend by aiming more at promoting a sustainable future for this industry in Malta whilst preserving the natural environments, but still many farmers choose not to practice these natural techniques. A qualitative study lends itself best to analyse such issue, with special reference made to the north area of Malta as a cluster sampling area. An in-depth analysis of a local farm converting to permaculture is carried out followed by open-ended, semi-structured interviews amongst a sample of local farmers, departmental representatives and two foreign experts. These provided a wide perspective with which to analyse the local agricultural situation and propose actions to be taken to improve the economic output of farming by investing in local resources, enhancing and strengthening the biodiversity, protecting the environment and generating alternative working opportunities, and promote agritourism. An important concept to hold on to is that of focusing on quality rather than quantity.

Supervisors: Dr. L.F. Cassar, Dr. A. Sacco, Dr. W. Teel

‘MSc.SERM’ / ‘MS. IS&T’

NOVEMBER 2010

Keywords: AGROFORESTRY, PERMACULTURE, SUSTAINABLE, LANDSCAPING, AGRICULTURAL MANAGEMENT.

Statement of Authenticity

I, the undersigned declare that this dissertation is the result of my own research. Any figures, conclusions and statements contained herein are mine unless otherwise stated.

Shawn Vella

November 2010

To my wife Fiona,
our families
and
closest friends
for their support

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Chapter 1: Introduction

1.1 Introduction

Agroforestry is a combination of agriculture and forestry, resulting in better management of natural resources and sustainable use of land where trees and shrubs are purposely grown together with agricultural crops and/or animals and where both ecological and economic interactions exist between the different components (Somarriba, 1992). According to Johnson (2006), it is the result of generations of trial and error and depends heavily on the farmer's knowledge of the land, plants and animals living on it. Traditional agroforestry systems are among the earliest land-use systems developed by mankind (Lelle and Gold, 1994), whilst modern scientific notions of agroforestry were only developed in the 1970s (Gordon *et al.*, 1997). Very similar to this idea is the concept of permaculture that *"refers to consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre and energy for provision of local needs"* (Holmgren, 2002). Permaculture is a contraction of Permanent Agriculture, a term coined by David Holmgren and his colleague Bill Mollison in the mid- 1970s to describe an integrated evolving system of perennial or self-perpetuating plant and animal species useful to man. Holmgren focuses his studies on the use of systems thinking and design principles that provide the organizational framework for implementing this vision. Sustainable agricultural management and landscaping through permaculture is successful when these permaculture principles are adapted to the farms' site and situation, taking into consideration ethical, moral, environmental and social issues. This farming method could improve agricultural sustainability, provide opportunities to diversify farm income, and create novel landscapes of high value (Dupraz & Newman, 1997).

Over the past years, agriculture in the EU has faced new challenges, where it has had to cater for multi-functionality, together with social issues such as rural-urban migration and ageing populations. There is a great emphasis on consumer health concerns which demand changes in the market-oriented farming, leading to a great need to introduce environmentally sound practices. Such shift is being made through a new Common Agricultural Policy (CAP) that aims at promoting food safety, the sustainable use of natural resources, and maintaining regional balance (Commissioner for Agriculture and Rural Development,(Cioloş, 2010).

The farming industry in Malta is also facing severe challenges. Total land area of the Maltese Islands declared by the holders declined by 11% in almost twenty years (1983-2001), there has been an increase in artificially irrigated fields, the introduction of more greenhouses, and an increase in land fragmentation. Moreover, a drop of 55 hectares of natural ‘garrigue’ land was recorded (NSO, 2007). An average of 4.8% of the agricultural area is unutilised or abandoned. There is a great dependency on chemical fertilisers and pesticides. This reduces the economic capacity of the farming industry and leads to soil erosion and land degradation. The Malta Environment and Planning Authority (MEPA), the Ministry for Resources and Rural Affairs (MRRA) together with the Malta Standards Authority (MSA) are the leading government agencies that set standards and regulations in Malta on the protection of the environment, agricultural and economic practices. Following EU recommendations, they are opting towards sustainable farming, with afforestation projects and the promotion of organic farming amongst others. Organic farming is an emerging practice in the Maltese Islands and is now included in the local governing policies (as shown in section 3.4). As at end 2007 there were 12 certified producers of organic products in the Maltese Islands (NSO, 2007), covering 17.3 hectares of land, representing 0.17% of Utilised Agricultural Area and 0.15% of total agricultural land.

1.2 Research motivation and problem definition

Sustainable agricultural systems have become both a research topic and a ‘political catch phrase’. However, there are yet few studies that show how this can be implemented into a holistic management approach which defines the decision making framework linking economical, social and environmental perspectives. The purpose of this research is to study agroforestry and permaculture as possible solutions to local small-scale farms.

This idea is a challenge to what we have had in the agricultural sector to date and needs to be well studied with site fieldworks, and be eventually backed with further computerised models, evaluating which crops yield the best profit and are most sustainable. These ideas have to be owned and promoted by the local governing bodies, ‘sold’ to the farmers, and implemented. Some of the potential problems to be dealt with may include:

- An initial economical assistance to interested farmers, who will have to endure a couple of years without obtaining an income whilst the land is left fallow to restore its lost nutrients.
- Farmers may be sceptic and not willing to change their farming methods.
- Few experiments have been locally carried out to evaluate if a reduction of crop yield is overpowered by overall profitability.

- Competition from abroad may put more stress on local farmers.
- Bureaucracy lengthening times of applications and transition phase.

1.3 Objectives

The overall objective of the present work is to gather an understanding of the farming situation in Malta, identify agroforestry and permaculture practices as possible solutions, and understand the implications why few farmers have yet adopted these methods. The following list shows a breakdown of these aims:

- Evaluate farming situation in Malta.
- Understand past and present farming techniques.
- Understand the perception of farmers, government departments, and of foreign experts on today's practices and their opinion about whether these are feasible and sustainable.
- Understand the farming community's future needs and government's targets to see whether they are congruent or conflicting opinions.
- Find possible solutions that are sustainable and energy efficient through adopting permaculture principles that are viable in the Mediterranean type of climate.
- Study a farm that is being converted to permaculture to understand the concept behind the design, the energy flow, the produce, its market potential, problems encountered during the transition phase and possible setbacks.
- Suggest possible changes in policy, and identify ways how to enhance communication between stakeholders so as to work together towards adopting agroforestry and permaculture principles.

1.4 Structure of thesis

According to the research plan, the thesis was divided into the following chapters where:

Chapter 2 puts Malta into perspective and focuses on its geography, geomorphology, climate, soils, woodlands, forests and agriculture.

Chapter 3 will give an overview of the literature review on agroforestry, permaculture, EU agricultural policies, sustainable agriculture in Malta, together with a suggested list of potential trees ideal for local farm designs.

Chapter 4 explores the methodological approach used in this qualitative study, which includes a triangulation method involving semi-structured interviews with famers chosen through purposive sampling, departmental staff, foreign experts and personal observations.

Chapter 5 investigates the implications behind designing a permaculture farm, and links this to a local permaculture farm with its inputs, outputs and onsite processes, problems encountered, together with relevant criticism.

Chapter 6 merges the results of the interviews, the case-study, and literature review through an ongoing analytical discussion.

Finally, Chapter 7 wraps up the thesis by summarising the general conclusions, and providing recommendations for further research.

Chapter 2: The Maltese Islands' geographical and agricultural background

2.1 Location and area

The Maltese archipelago comprises a group of islands located in the central Mediterranean, some 96 kilometres south of Sicily. The main islands are Malta, Gozo and Comino, and the minor ones are Cominotto, Filfla, St. Paul's Islands and Manoel Island, together with a number of islets and rocks. The total area is 316 square kilometres, with a total population of 413,609 persons (DOI, 2010), making Malta one of the most densely populated countries in the world with 1308.9 persons per square kilometre (DOI, 2010), a country that today is facing land-use conflicts (Benoit and Comeau, 2005).

2.2 Climate

Malta has a typical Mediterranean climate with warm, wet winters and hot, dry summers. Total annual average rainfall is estimated to be 558.2 mm (22 inches) which falls mainly between October and March (NSO, 2002). Temperatures are very stable, the annual mean being 18°C (64°F). Average hours of sunshine are five to six hours per day in mid-winter and over twelve hours per day in mid-summer (NSO, 2002).

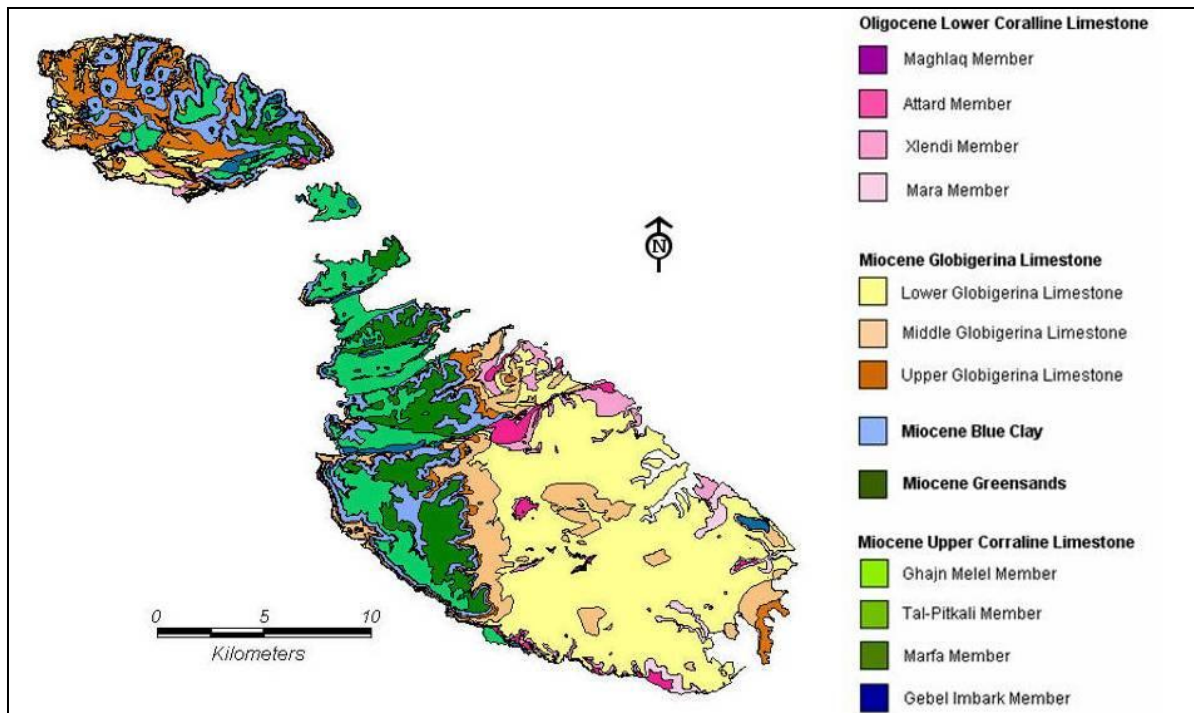
The Maltese Islands are also heavily influenced by the strength and frequency of the wind, the most common being the North Westerly (*Majjistral*) 19.8% and the North Easterly (*Grigal* or *Gregale*) 5.6% (Schembri and Baldacchino, 1998). These blow from over northern Europe and bring cold temperatures along with a pronounced chill factor. In the summer months, the South Westerly wind (*Xlokk* or *Scirocco*) prevails, bringing warm, humid (65-80%) conditions from over the Sahara Desert (NSO, 2002). Humidity in Malta is relatively high due to the overall vicinity of the sea. The average winter humidity is 79%, that for summer 71%. Extremes of 99% (13/02/1958) and 28% (14/08/1957) have been recorded (Cutajar *et al*, 1992).

23 Geology, geomorphology and hydrology

The Maltese Islands are composed of sedimentary rock formed during the Tertiary, specifically during the Oligocene and Miocene, period. Lower Coralline Limestone was the first to be formed through the Oligocene period about 35-25 million years ago. The other four layers were formed during the Miocene. About 5-7 million years ago, the sedimentary layers were uplifted by plate movement (faulting and upward movement of the sea floor), following constructive plate movement of the Eurasian and African plate. The Maltese Islands form part of the Pelagian Block (including the Maltese Islands, the islands of Lampedusa and Lampione) (Pedley *et al*, 2002). The Islands are situated on a shallow shelf, the Malta-Ragusa Rise, part of a submarine ridge which extends from the Ragusa peninsula of Sicily southwards to the African coasts. Geophysically, the Maltese Islands and the Hyblean Plateau of south-eastern Sicily are generally regarded as part of the northern-most segment of the African continental plate (Capula, 1994). Each layer of rock of the Maltese Islands has different characteristics depending on the marine environment, such as depth, temperatures and currents at the time of deposition (Table 2.1, Map 2.1 and Plate 2.1).

Table 2. 1: The 5 layers of rock found in the Maltese Islands (Source: Pedley *et al*, 2002)

Rock Type	Description
Lower Coralline Limestone	The hardest rock, used for spalls, and is exposed to a thickness of 140 m.
Globigerina Limestone	Used mainly for construction work, is exposed to a thickness ranging from 23 m to 207 m and subdivided into three units (Lower, Middle and Upper Globigerina Limestone) by two phosphate pebbled beds.
Blue Clay	Exposed to thicknesses of up to 65 m, is the only rock that is porous and impermeable and is very important for the creation of the perched aquifer.
Greensand	Exposed to a maximum thickness of 12 m, and erodes fairly quickly.
Upper Coralline Limestone	Exposed to a thickness of 162 m. This formation is a complex association of limestones, is also very hard and used mainly for spalls.



Map 2.1: Geological Map of the Maltese Islands (Source RDD-MRAE, 2004)



Plate 2.1: Rdum Qammiegh area, Mellicha (Source: Vella, 2010)

Deposition of these marine sediments stopped some 10 million years ago when the seabed rose above sea level. Localised quaternary deposits of Pleistocene age (1.9-0.01 million years ago) occur and comprise “fossil” soils (palaeosols), fluvial gravels, coastal conglomerates and breccias, dunes and infillings of caves and fissures (Pedley *et al*, 2002).

Each exposed porous limestone rock undergoes continuous erosion and weathering and forms specific Karst formations including doline features, underground caves, wadis with ephemeral streams, mesas, buttes, potholes and solution subsidence structures amongst others. The erosion of each rock is, however, different and gives rise to different characteristics and different soils (Schembri, 1989). Malta's geomorphologic structure is furthermore characterised by its NW–SE and ENE–WSW rift tilt which is the cause of the uplifting of the west coast and the formation of the famous Dingli cliffs and Ta' Ċenċ cliffs amongst others, while dipping gently into the sea from the East coast. The series of faulting seen on the islands resulted in a series of horst and graben system stretching all the way to Gozo (Schembri, 1997). These series of block faulting exposed different rock layers and led to the formation of different soils. It also created important agricultural plains, such as Pwales valley, Mizieb and Mġarr, with drainage parallel to the general strike of the horst-graben system and the few intermittent streams flow into the bays to the north-east (Fig. 2.1 and Fig. 2.2).

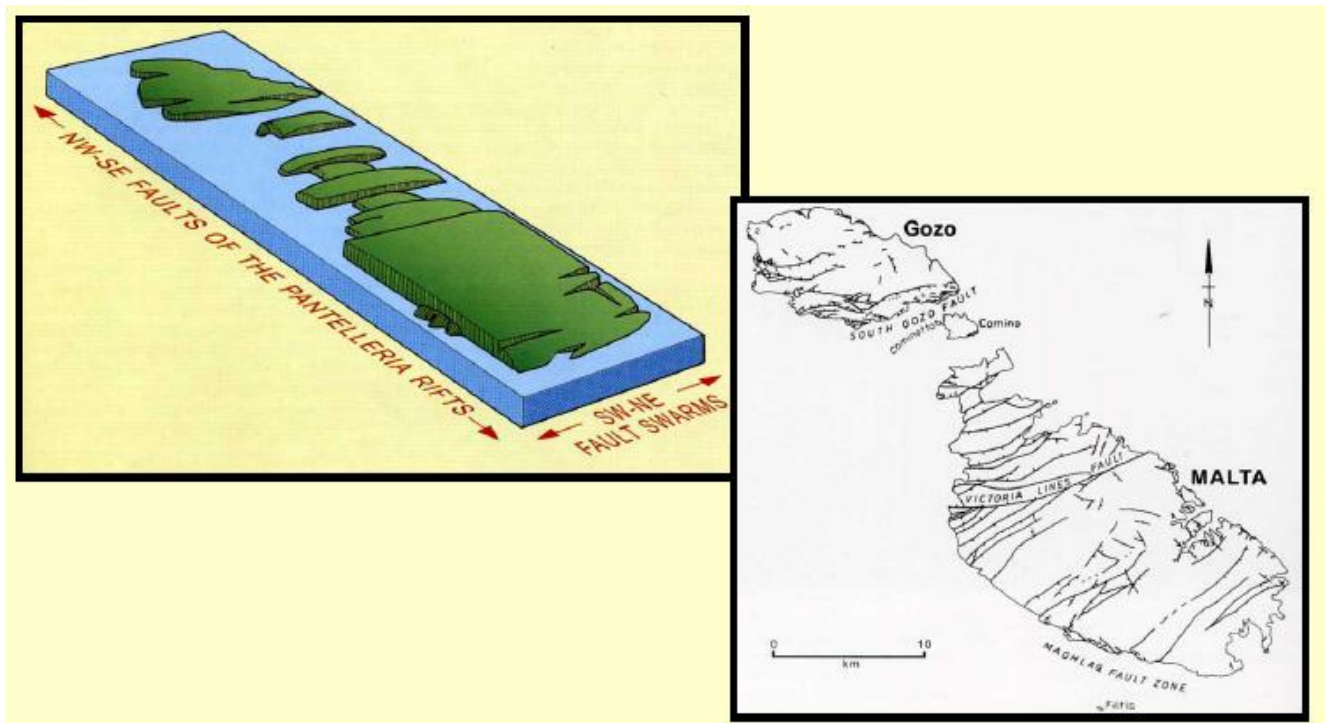


Fig. 2.1 and 2.2: Faulting in Malta, horst and graben (Source: Pedley *et al*, 2002)

The limited amounts of rain, warm temperatures and lack of any significant relief (e.g. mountain ridge) makes Malta a semi-arid country, depending heavily on the stored rain water and the so-precious underground water, which is found in the perched aquifer and mean sea-level aquifer (Fig. 2.3).

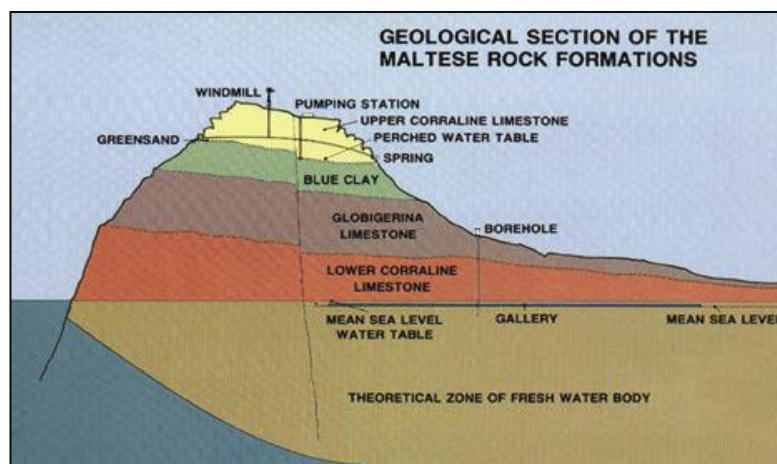


Fig. 2.3: Cross section of the Maltese Rock Formation, including the Perched and Mean Sea-Level Aquifer (Source: PAP, 2005)

Archaeological evidence at the Megalithic temples of Mnajdra and Hagar Qim has shown that lack of fresh water was always an issue on these Islands. In order to collect this precious resource the first settlers dug a group of rock-cut cisterns known as the Misqa Tanks (FAO, 2006). Preservation of such freshwater stayed a major issue through the ages. When the Knights of St. John were given these Islands by King Charles V in 1512, Knight Quintinus Haedus reported that:

“The water is salty and putrid but there are good springs which are probably due to rain fallen in winter time. The origin of these springs is not very deep, they often disappear in summer but they always diminish in volume. One generally drinks rainwater collected in tanks or in ditches.”

(FAO, 2006, pp 8)

In 1610, the Knights built the largest system of aqueducts which ran across the island, starting from the natural spring source found at Rabat plateau up to the new city Valletta. Under British rule (1800-1964) various other infrastructural works were carried out, which included the digging of a deep well close to Valletta, the first installation of a water pump in 1851, the construction of water galleries to pump up water from the ground water aquifer and, in 1881, the building of a boiling-type distillation

plant in Tigne' (BRGM, 1991). Other works followed, such as the construction of an underground reservoir in 1886, pumping stations and galleries such as those at Wied il-Kbir, major pipe laying works between 1955 and 1961, and four multi-flash seawater distillation units between 1965 and 1968 (Morris, 1952). In time, with an ever growing population and industrial development, these structural works have not met the Islands' needs for fresh water and, in the 1980s, Reverse Osmosis plants were constructed by the Government of the day at Pembroke, Cirkewwa and Ghar Lapsi (Spiteri, 1987).

Up till 2006, the total surface water resources were estimated at $0.5 \text{ Mm}^3/\text{yr}$. The total dam capacity of a large number of small dams constructed across the drainage lines is estimated to be $154,000 \text{ m}^3$. The largest aquifer is the mean sea-level aquifer that consists of a Ghyben-Herzberg lens of freshwater (Fig. 2.4) floating on denser saline water in limestone rock at sea level. The renewable groundwater potential of the Maltese Islands is estimated at $40 \text{ Mm}^3/\text{yr}$. An estimated $20 \text{ Mm}^3/\text{yr}$ are extracted from potable water production sources (13 pumping stations and 160 boreholes) and about 5,113 registered private wells (FAO, 2006).

It is estimated that about 6% of the total annual rainfall is lost directly to the sea as surface runoff. The rest of the water percolates through the ground where it is partly retained by the soil. Most of this water (70-80% of total rainfall) is in turn lost to the atmosphere via evapo-transpiration. The remaining water percolates deeper into the ground until it reaches the aquifers as recharge water. It is estimated that almost half of this recharge water is in turn lost to the sea by natural subsurface discharge at various points along our coastline (NSO, 2003).

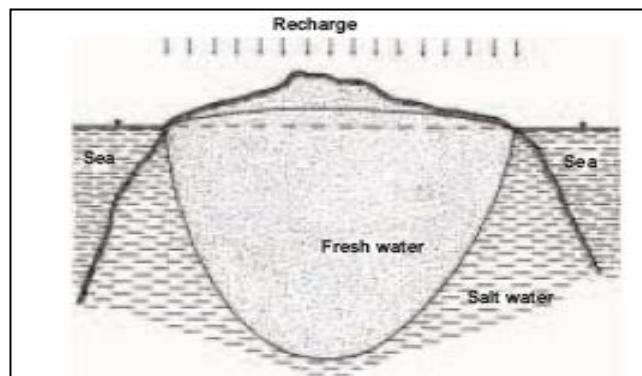


Fig. 2.4: Ghyben-Herzberg (floating) groundwater body in an island (Source: FAO 2006)

2.4 Soils

Soils of Malta are considered as young and immature since pedological processes are slow in calcareous soils. They are also described as 'artificial, being man-made or altered, and highly calcareous' (Vella, 2001). The warm and dry conditions of the Mediterranean climate do not favour leaching, thus producing little or no humus horizons. The Maltese soils are mostly shallow, 20-60 cm deep on ridges, plateaux and plains. Deeper soils are found in isolated pockets (150 cm) but are rare. Soils tend to be saline due to vicinity of sea water and high evaporation rates. There are three main types of soil - Carbonate Raw Soil, Xerorendzina and Terra Rossa, (Table 2.2 and Plate 2.2) which are subdivided into seven major soil reference groups (Fig. 2.5)

Table 2.2: Soil Types (Source: Schembri, 1989)

Soil type	Description
Carbonate Raw Soil <i>(yellow-whitish)</i>	Developed on weathered quaternary sandstones, Greensand, the lower beds of the Upper Coralline Limestone, Blue Clay and Globigerina Limestone. It is immature and has a very high level of calcium carbonate.
Xerorendzina <i>(brown)</i>	Is an immature soil developed from weathered Globigerina and on valley deposits and is generally found occurring naturally in the centre and South of Malta. It has a high calcium carbonate content and little organic matter.
Terra Rossa Soil <i>(reddish)</i>	Developed on karstland from weathered Upper and Lower Coralline Limestone, and is mostly found in Comino, North and NW Malta. It formed during the Pleistocene, and is relatively little affected by present climate. It is relatively mature, has a low calcium carbonate content and is also low in organic matter

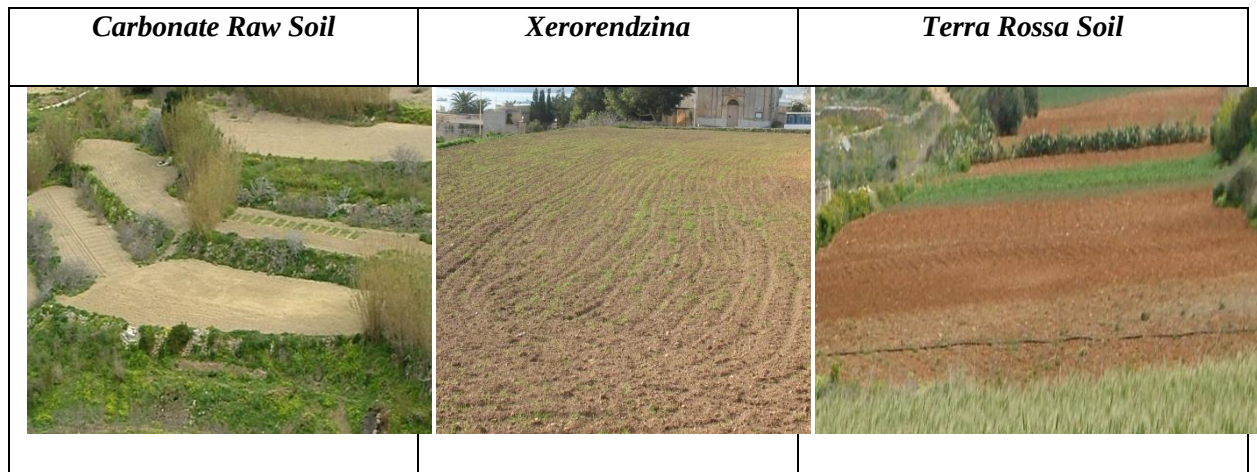


Plate. 2.2: Soil Types (Source: Vella Ciangura, 2010)

Although the high amount of calcium carbonate influences plant growth by effecting uptake of certain nutrients, it prevents the accumulation of sodium in the exchange complex and hence minimises alkalinity hazards as a result of irrigation with highly sodic water. This leads to salinisation which is the process that leads to an excessive increase of water-soluble salts in the soil. Salt particles which accumulate in soil include sodium, potassium, magnesium and calcium, chloride, sulphate, carbonate and bicarbonate (mainly sodium chloride and sodium sulphate). According to the European Commission Joint Research Centre:

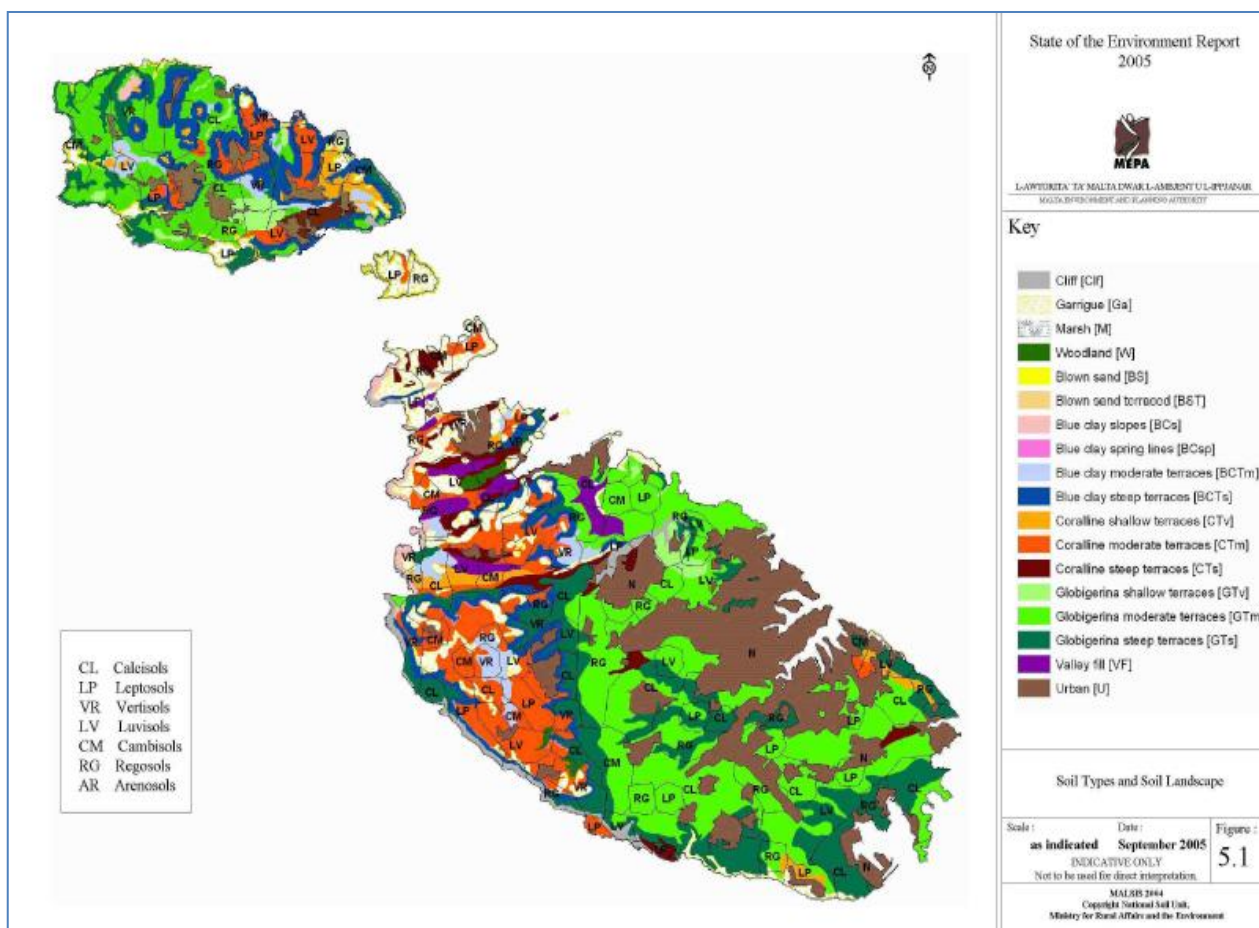
“A distinction can be made between primary and secondary salinisation processes. Primary salinisation involves salt accumulation through natural processes due to a high salt content of the parent material or in groundwater. Secondary salinisation is caused by human interventions such as inappropriate irrigation practices, e.g. with salt-rich irrigation water and/or insufficient drainage.”

(JRC, 2010, pp10)

This poor quality water is extracted from brackish boreholes and treated sewage effluent that has a high level of salts. Up to date there is little documentation about the amount of salt-affected soils in the Maltese Islands. However, the MRRA has conducted field observations through water percolation¹ and seepage² where it indicated that soil salinity is a potential constraint for agricultural production (Vella and Camilleri, 2003).

¹ Percolation: The ability of soil to absorb water

² Seepage: The percolation through the soil from unlined channels, ditches, watercourses, and water storage facilities



Classification of the Maltese Landscape and soils, following the FAO criteria are grouped into two main categories: (i) semi-natural landscapes, formed as a result of human activity over time and (ii) man-made landscapes where the influence of man can be identified in the widespread terracing of sloping land, and the creation of made ground through the movement of large quantities of soil material and deposition on rock or rock rubble. The seven major soil reference groups in Malta are: Calcisols (CL) - these are the dominant soil group in the Maltese Islands with high CaCO_3 concentrations; Leptosols (LP) - occur mainly on the vertical cliff faces where a very thin weathered layer of soil overlies rock at less than 10 cm depth; Vertisols (VR) - clayey soils recognized by the presence of deep, wide cracks during the dry months and the presence of slightly gleyed and rusty mottles; Luvisols (LV) - the reddish clay Luvisols in Malta are relict soils probably formed during wetter climatic conditions associated with glacial advances in Northern Europe; Cambisols (CM) - are soils with limited development showing only a distinct subsoil with a significantly different (brownier or redder) colour to the topsoil but no characteristic calcic or reddish clay argic horizons; Regosols (RG) - a group that includes 'other' soils, with very limited development in virtually unaltered parent material, showing no dark coloured topsoil and no distinct subsoil horizons, commonly found on terraces overlying urban waste material; Arenosols (AR) - the deep sandy soils developed in residual sands, in situ after weathering of old, usually quartz-rich material or rock, and soils developed in recently deposited sands as occur on beach lands.

Map 2.2: Soil types and soil landscapes of the Maltese Islands as classified by the FAO
(Source: MEPA, 2005)

2.4 Human influence on natural environment

The Mediterranean woodland is the climax vegetation of the Maltese Islands and this, in turn, is conditioned by several factors, namely geomorphology, climate and anthropogenic factors. The Islands are formed from limestone rocks, with young soils very similar to the parent rocks. There are no mountains, streams or lakes, but only minor natural springs most of which were tapped for irrigation purposes. The main geomorphologic features are karst limestone plateaux, hillsides covered with clay taluses, gently rolling limestone plains, valleys that drain runoff during the wet season, steep sea-cliffs on the south-western coasts, and gently sloping rocky shores to the Northeast. The main vegetation types are maquis, garrigue and steppe; minor ones include patches of woodland, coastal wetlands, sand dunes, freshwater, and rupestral communities (Lanfranco, 1996). These have since been revised as a result of the Nature 2000 Habitats Classification where:

“To date, Malta has 28 Sites of Community Importance (eventually Special Areas of Conservation) declared under the EC Habitats Directive and 13 Special Protection Areas declared under the EC Birds Directive.”

(MEPA, 2010)

Today's remaining natural vegetation cover is the result of the influence of different civilizations that have inhabited the Maltese Islands. The first settlers are believed to have come from Sicily in Prehistoric times about 5200 BP (Bonnano, 1987) and were then followed by the Punic (Phoenicians and Carthaginians), Romans and Byzantines, Arabs, Normans, Aragonese, Castilians, Spanish, Knights of the Order of St. John, the French and the British. The limited information available on tree and woodland coverage prior to human habitation of the Islands and in prehistory includes the studies done on sub-fossilized pollen and leaves in Quaternary deposits and charcoal from the Neolithic Period (Stevens *et al*, 2006). The four forest remnants known are all found on the island of Malta. One of these was severely degraded, with most trees being destroyed in 1993. The remaining remnants are small relict isolated pockets, characterized by old Holm oak trees found at Il-Ballut (limits of San Pawl il-Bahar), Il-Ballut ta' l-Imġiebaħ` (limits of Mellieħa), Il-Bosk (limits of Rabat) and Wied Hażrun/Ta' Baldu (limits of Dingli). Some of the trees found in these remnant forests are estimated to be 500-1000 years old, but are probably older, definitely amongst the oldest trees in the Maltese Islands. This woodland probably disappeared as a result of a combination of fire and overgrazing by sheep and goats, timber and firewood collection enhanced during the British rule, together with agricultural expansion (Sultana *et al*, 2002). Today, tree cover of the Maltese Islands is only about 5% (MEPA, 2010), and most of the trees are not native to the Maltese Islands but are alien species

introduced, directly or indirectly, by man (FAO, 2006). These forest remnants continue to be threatened by off road activities, illegal dumping, fire, grazing, quarrying, vandalism and the ever increasing population density, urban sprawl (with more than 29% of the surface area being built-up), the need for recreational spaces and the change in economic strategies (MEPA, 2010)

2.5 Reafforestation initiatives in Malta

Prior to 2004 and the accession of Malta to the European Union (EU), environmental law enforcement and education were minimal, leading to widespread land degradation. This was mainly caused by illegal dumping of domestic waste, farming residues and industrial waste in valleys and cliff ('irdum') sides (Ramblers, 2010), planting of alien species for hunting and trapping purposes and the clearing of indigenous trees for agricultural practices. Moreover, the Malta Environment and Planning Authority (MEPA) issued permits outside development zones (valley beds and other remote sensitive areas), the Ministry of Agriculture (today the Ministry for Resources and Rural Affairs - MRRA) lacked the correct data to preserve remaining trees and woodland and the Police force was not properly equipped to monitor the natural environment. Sometimes NGOs put excessive pressure on government to reforest without a thorough understanding of local biodiversity needs. The responsibility for environmental management was shared and thus fragmented amongst a number of government departments and agencies, where bureaucracy ruled and enforcement lagged.

Since Malta's accession to the EU in 2004, the Maltese Government has been closely following the Council Directive 92/43/EEC, which is locally transposed as the Flora, Fauna and Natural Habitats Protection Regulations - Legal Notice 311 of 2006. This is part of the Natura 2000 network which aims at protecting threatened species, identifying and monitoring areas of ecological conservation, controlling activities affecting habitats and species, eradicating and controlling of alien species while re-introducing local species. There is also increased communication, education and public awareness campaigns (EU Habitats Directive, 1992).

2.6 Agriculture

In the past decades Maltese agricultural activity has drastically declined due to the country's economic development process and today this industry accounts for only about 2% of the GDP (MRRA, 2006). In time, farming methods shifted from subsistence to commercial, especially in the post-war period due to pressures of an ever declining labour force and the reduction of agricultural land. The decrease in the farming population brought several problems to this industry including land degradation, soil erosion, abandonment of fields, lack of traditional crop rotation and a totally market dependent activity. The number of farmers today amounts to only 14,113, of which approximately 1,524 are full time farmers. This brought even more constraints leading to monoculture farming aimed only at profit making (MRRA, 2004).

Malta's production is dominated by animal husbandry - mainly cows and pigs. Goat farming declined in the early fifties after an increase in forage costs and government's legislation to promote cow's milk. Poultry and rabbit meat are also highly produced. Crops are grown mainly on three different landscapes:

- *Rdum* and *ġnien areas* (cliff sides and garden-type agriculture) which are intensively farmed and suitable for high quality fruit and grapes
- *Xagħra* (barren meadows) good for fodder and legumes
- Dry farming ideal for vegetables mainly potatoes, but other crops are grown in irrigated areas, e.g. artichokes (Busuttil, 1993).

Maltese farmers are limited by the lack of fresh water, lack of financing facilities, and small land plots resulting from land fragmentation. They are forced to maximize profits in order to compete between themselves and produce imported from Europe and the world. To add insult to injury, farmers do not sell their produce directly to the consumer but make use of market intermediaries better known as *Pitkal*³ who sell it at higher prices, leaving the farmer with a marginal profit. Due to this situation some farmers started selling part of their produce in countryside and coastal roads close to their fields. Other farmers simply gave up what they did since childhood and searched for jobs in the construction or service industry, leading to loss of a skilled workforce and further land degradation.

³ The *Pitkal* is a person who is in charge of the ingoing and outgoing of fruit and vegetable from the *Pitkaliġa* (the only farmers' market on the island located at Ta' Qali). The *Pitkal* is thus in charge of stock-taking and selling of all farmers' produce to hawkers and the general public with a guide price established by the Ministry of Resources and Rural Affairs

Currently, the small number of full time farmers is predominately over 65 years of age who work a seven-day week in a risky industry that is phasing out. Such a trend is inevitably having negative impact due to loss of skilled workers and an increased dependency on processed foods (NSO, 2003) leading to marginalisation of land, which

“... is a process driven by a combination of social, economic, political and environmental factors, by which the management of certain areas of farmland cease to be viable.”

(IEEP, 2010, pp4)

According to Salvino Busuttil (1993) this process could be slowed down by land consolidation and the extension of cooperative agriculture with an emphasis on high quality horticultural products for export. These ideas could be achieved following sustainable farming practices, such as agroforestry and permaculture principles.

2.7 Agroforestry and Permaculture

Agroforestry is an agricultural system which encourages the growing of trees or shrubs among or around crops or on pastureland, as a means of preserving or enhancing the productivity of the land (Brenes, 2005). It includes methods considered organic rather than promoting those used in conventional agriculture. Permaculture goes a step further. It gives a holistic approach on how farmers should understand their surrounding environment and work in harmony to produce diverse organic produce, increase energy output, reduce waste and protect the ecosystem (Jacke, 2005). These concepts used to form the basis of the Maltese traditional farming system practiced for hundreds of years. Due to conventional farming, this system was abandoned and cash crops for profit dominated. Today the farming techniques have brought an unbalance in the surrounding ecosystems leading to loss of biodiversity. Farmers are starting to realize that competing with a single product is not feasible anymore. Therefore, agroforestry systems need to be reintroduced on a national scale so as to benefit both the farmers and the natural environment. It is a highly effective system that should also be adopted by the Ministry for Resources and Rural Affairs to manage abandoned fields in a sustainable manner.

Tentative studies to restore areas of concern have already been carried out by the Maltese Government. Unfortunately, efforts are still limited due to lack of education, lack of personnel and

bureaucracy. Several afforestation projects were, in fact, carried out during the last five years (including the 34U campaign at l-Ahrax tal-Mellieħa on the northern-most promontory) where thousands of trees were planted. However, the problem lies in using 'political' trees that render a larger commission to local green suppliers rather than indigenous ones that improve biodiversity. Another issue is that alien species like eucalyptus tend to grow faster and so are preferred by many (PAP, 2005). According to Sutherland, the introduction of alien species often creates a considerable number of problems mostly through competition for space (Cassar, 2010). Meffe and Carroll argue that these non-native species can replace the native flora and fauna through predation or parasitism. Quezel *et al* (1990) gives a detailed description of how the Cape Sorrel manages to do this. This geophyte⁴ is by far the most widely spread plant in the Maltese Islands (Schembri *et al*, 1996).

As discussed earlier in the text, policies are still lacking in this regard; however since EU accession Government is obliged to meet various deadlines, involving several private stakeholders who are willing to invest in the environment. A case in point is the BIOLMED Primo Project, an EU project aimed at the revival of indigenous olive trees in the Mediterranean basin for a quality type of olive oil making by using organic farming methods (EU Quality label standards including: Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI) (BIOLMED, 2010). Giving an increased importance to agriculture, reafforestation and the environment will not solely improve the Maltese economy and meet EU demands, but would prove an essential part in promoting a sustainable way of living.

⁴ Geophyte: a perennial plant which regenerates every year from an underground organ such as a bulb or tuber, for example the potato

Chapter 3: Agroforestry and Permaculture

3.1 Agroforestry: Definition

Agroforestry is considered to be one of the oldest and most successful agricultural practices around the world. According to Johnson (2006), it is the result of generations of trial and error and depends heavily on the farmer's knowledge of the land and the plants and animals living in it. Traditional agroforestry systems are among the earliest land-use systems developed by mankind (Lelle and Gold, 1994). According to the United States Department of Agriculture (USDA), the most basic definition of agroforestry is,

".. the intentional growing of trees and shrubs in combination with crops or forage. Agroforestry also includes tree and shrub plantings on the farm or ranch that improve habitat value or access by humans and wildlife, or that provide woody plant products in addition to agricultural crops or forage."

(USDA, 1996, pp 1)

Today, agroforestry can be generally divided in silvoarable (tree-crop) and silvopastoral (tree-livestock) systems, being often combined in the farm strategy management (Palma, 2006).

Traditional farming methods are being abandoned and mainly forgotten due to the higher demand for food production. This demand is being met by practicing monoculture, which goes against natural equilibrium and puts great strains on the land (Rigueiro *et al* 2009). By producing the same crop year in year out, the soil becomes increasingly exhausted and thus farmers are forced to use more and more artificial fertilizers and pesticides to replenish the lost minerals and try to combat fungi, insects and pests that become adapted to the chemicals used. Monoculture is leading to the destruction of natural habitats, eutrophication, leaching and the contamination of ground water-tables, rivers and lakes. Moreover, it causes the loss of traditional sustainable agricultural methods and agricultural knowledge which in the past was handed from one generation to the next (Current *et al* 1995).

Agroforestry systems, if properly handled, could benefit both the farmer and the environment. They help in the absorption of rainwater and its storage in the upper horizons of the soil profile. This increases crop productivity, controls soil erosion, water run-off and keeps snow from accumulating in certain areas of a particular field or road.

Studies in the Mediterranean and Atlantic regions of Europe showed that the adoption of silvoarable (tree-crop) agroforestry systems can potentially lead to:

- “a) Reduction of ... soil erosion ... which can preserve productive soil functions and mitigate the pollution of surface waters with soil particles and absorbed phosphorus and pesticides;*
- b) Reduction of nitrate leaching through the formation of a ‘safety net’ of tree roots under the crops and increased water uptake of the system;*
- c) Carbon sequestration through the storage in wood not used for combustion;*
- d) Increase of landscape biodiversity due to an increased availability of habitats for wild species.”*

(Palma, 2006, pp 9)

According to Johnson (2006, pp 2-6) agroforestry systems are divided into various categories and include:

Table 3.1: Agroforestry and categories

Category	Description
Alley cropping	Planting trees and shrubs in lines across fields to protect crops and animals. These should be planted in proportion to the field size so as to make it easy for the farmer to work the land.
Contour buffering	Planting trees and shrubs on contour lines. Leaf litter provides soil cover and fertiliser. Buffers help in reducing sheet and rill or gully erosion and even trap sediment so as to increase the soil profile. Field design should also enable the easy use of machinery.
Buffers	Buffers are used specifically to protect wetlands and filter out nutrients, capture sediments, and reduce potential bacterial contamination. Buffers basically consist of planting trees and shrubs adjacent to the river system. These protect near stream soil erosion and strengthen river banks with a diversity of root systems. These buffer zones also provide shelter for wildlife.
Filter strips	Here trees are planted in a way to filter sediment, organic matter and pollutants found in runoff and wastewaters. Trees are planted on cross-slopes or on contours downhill from the source of pollutants.

Multi-storey cropping	Trees, crops and livestock are harvested to make the most of the land, with trees planted in a particular manner to allow adequate light into the under story. This system yields wood or tree production in addition to agronomic crops or forage, improve crop quality and improves soil nutrient recycling for both crop or forage use.
Wood fibre plantation	A system of plantation created by planting trees in a block on a separate field within a farm. The main idea is to diversify farm productivity and protect crops from winds as trees act as windbreakers and shelterbelts.

Agroforestry, however, is not limited merely to the methods outlined by the USDA. It ranges from planting a few trees in fields and pastures to planting crops randomly underneath the forest canopy. According to Johnson (2006), other methods related to agroforestry include:

- **crop rotation** - growing crops in a planned sequence on the same field year after year.
- **partnership cropping** - where two crops are partnered to help the growth of one crop or both.
- **polyculture** - planting two or more crops to elicit competition.
- **relay cropping** - planting three or four crops in the same piece of land in one year.
- **companion cropping** - planting of long and short season crops with the intention of harvesting the short season crops first to make room for the long season ones.
- **intercropping** - associated with small farms and is basically achieved by planting short crops in between rows of tall ones (highly efficient use of land but difficult to work).

3.2 Precautions prior to initiating Agroforestry practices

“The success to any agroforestry systems relies heavily on exploitation of the component interaction due to difference in growth pattern and resource requirement of the components ...”

(Kumar *et al*, 2007, pp 91-92)

Agroforestry is highly specific to each locality. The good news is that it encourages local food production and growth together with biodiversity. However, careful planning is critical. Introducing the wrong species in an area could be disastrous, as it would modify local crops (Kumar *et al*, 2007). Planting only one tree species might also bring devastating effects if infested by diseases and pests.

Planting too many trees could bring new microclimates, thus making the field too cold, too hot, or too dry for crops to thrive. Agroforestry is not a quick fix but is a long term sustainable solution for ecosystems, crops and animals to flourish (Mukadasi *et al*, 2007). It is a way to prevent and manage pests and other problems before they strike but is not a cure to be used when they are already there (Buck *et al*, 1999). Thus, to make sense, agroforestry should be linked with Permaculture methods and principles as accounted by Holmgren in his book *Permaculture: Principles and Pathways beyond Sustainability*.

3.3 Permaculture Solutions: Definition

Permaculture is a way of living, the solution seen by many to solve agricultural and world problems. The principles it follows are those of life, where it tries to understand and interpret the world's natural systems and amalgamate them into our way of life, agriculture and industry. Permaculture sees permanence in culture itself, and focuses on building with living resources, growing plants as crops near home and increasing biodiversity in farms, gardens, green areas and even at home. This concept was developed by David Holmgren and his colleague Bill Mollison in the mid 1970s to describe an integrated evolving system of perennial or self-perpetuating plant and animal species useful to man (Holmgren, 2002).

“Permaculture refers to consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre and energy for provision of local needs.”

(Holmgren 2002, pp 11)

More precisely Holmgren sees permaculture as the use of system thinking and design principles that provide the organizational framework for implementing this vision. In other words it empowers us to provide for our needs without compromising the needs of future generations. Holmgren emphasizes that permaculture builds on the landscaping and the skills acquired through organic farming, sustainable farming and energy efficient building to design, establish, manage and improve these and all other efforts made by people towards a more sustainable future, especially at household and small farm level.

The oldest and perhaps the most stable example of permaculture are the tropical rainforests which are very diverse and continuously becoming more complex. These tropical soils are, *per se*, infertile. What makes this terra preta so productive is the continuous nutrient cycle taking place. Being millions of

years old, they are highly adaptable and productive (Bhatt *et al*, 1995). This is how our surrounding environment should be - a living system able to support itself. People should learn from forests and design practical agricultural systems following such ideas. Unfortunately, modern monoculture practices try to simplify nature to provide cash crops for the ever increasing world population (Hopkins, 2008). Producing such necessities leads to loss in biodiversity that consequently leads to great environmental problems. Producing single crops means producing single pests. So farmers start using pesticides in large amounts, which bring about further unintended consequences. Clearing forests or practicing over cultivation causes soil erosion, nutrient loss and leads to an agricultural and economic decline (Franzel *et al*, 2001). Cases in point include Haiti, where soil is limited and India and Ethiopia where the tragic famine caused mainly by improper agricultural practices led to deforestation and land degradation. The root cause of much deforestation in all these three countries was a combination of bad governance (Bhatt *et al* 1995). Aspen Edge, owner of a conservation farm in Europe, uses Holistic Management for sustainable land stewardship in brittle landscapes and uses permaculture as a design tool. According to her, each design must mimic the natural environment it is found in, and adopt the practices that best fit. For example, practices that work well in wet, humid or temperate areas do not necessary apply to parts of the world that have low, inconsistent year-round moisture with a period of drought during the growing season, like the Mediterranean region (see chapter 4) (Edge, 2009).

Permaculture is therefore of utmost importance if we want to make a positive culture shift. Farmers, citizens, architects, as well as planning authorities, need to understand the importance that a rich biodiversity has on natural systems (Ramachandran, 2007). Farmers need to plan and design their farm following such basic natural concepts (Kourik, and Creasy, 2005) and incorporate green planning, water catchment systems, and renewable energy sources (NSAIS, 2002). Plants should be grown in each field according to regional indigenous factors (Jacke and Toensmeier, 2005) Having a varied vegetation cover generates nutrients and mulch, controls weed and moisture, and produces fodder crops, encourages earthworm and other insect growth which in turn increases soil aeration (Holmgren, 2002).

In time, people tried to harness nature and sought order, hygiene, symmetry and control even on the environment, turning a highly productive natural system into one that is decidedly consuming. Gardens too can be planned to achieve a rich biodiversity that is stable and produce foliage, flowers and crops all year round (Houx *et al*, 2009) Part of the system should be planned specifically for the animals as no ecosystem is complete without fauna (Mollison, 2002). For example, domestic ducks or even wildfowl could be encouraged to eat weeds. While chickens act as a 'shredding machine' and

pest control agent the garden, in turn, provides chickens and ducks with shelter, food and water. All this would also reduce costs and pollution generated in transporting, packaging and providing electricity required to produce food. These are further explained in the twelve principles of Holmgren in the next section.

3.4 The Principles of Permaculture

Permaculture farms follow ethical and moral principles that try to strike a balance between cultural evolved mechanism, such as norms and values, and a longer-term understanding of good and bad outcomes. These ethics have been further divided into three main areas:

- **Care for the earth** (soil, forest and water)
- **Care for people** (looking after yourself, family and community)
- **Fair share** (set limits to consumptions and reproduction, and redistribute surplus)

According to Holmgren, design principles can be organised under twelve categories where the first six principles consider a bottom up approach including elements, organisms and individuals while the rest use a top-down perspective of the patterns and relationships that emerge from system self-organization and co-evolution. These are explained in table 3.2:

Table 3.2: Permaculture Principles

Principle	Explanation
1. Observe and interact	A good farm design comes through the interaction of all components.
2. Catch and store energy	Invest in designs that store energy from renewable sources such as sun, wind, run-off water, humus building and fertile soil.
3. Obtain a yield	Invest in polyculture that provides an income all year round from a diversity of crops. Here farm systems work efficiently.
4. Apply self-regulation and accept feedback	Opt for semi-wild and self-reproducing crop varieties and livestock breeds, instead of highly bred and dependent ones.
5. Use and value	Obtain energy from sun, wind and fuel wood. Favour locally grown

renewable resources and services	products and make use of non-consuming natural services - such as chicken or pigs - to prepare ground for planting.
6. Produce no waste	Waste is a resource and opportunity - example: using composting toilets.
7. Design from patterns to details	Environmental factors such as sun and wind, and human factors such as farm buildings, can all be arranged around the same focal point to achieve a good permaculture design.
8. Integrate rather than segregate	Careful placement of plants and animals is highly important - example; grazing livestock should be rotated accordingly in a particular area to control weeds.
9. Use small and slow solutions	Patience is fundamental to success - example: a good result from a little fertilizer does not mean better results from more.
10. Use and value diversity	Polyculture reduces dependency on the market systems and supports communities by providing a wide range of agricultural products and services.
11. Use edges and value the marginal	Example: increasing the boundary between field and pond can increase the productivity of both.
12. Creatively respond to change	Example: use of fast growing nitrogen fixing trees to improve soil and provide shelter and shade for more valuable slow growing food trees.

3.5 EU Agricultural Policies

3.5.1 Agriculture in the EU - the Common Agricultural Policy (CAP)

Farmers have an intensive role of supplying the population with an adequate food supply. They have to practice traditional skills, learn how to use science and technological innovations to provide crops at affordable prices. Moreover, they are responsible for land management, environmental development, food safety, animal welfare and eco-tourism (European Commission, 2010). The EU is the major exporter and largest importer of food products in the world. Farming in the EU is controlled by the Common Agricultural Policy (CAP), which dates back to the 1950s following the devastating effects World War II had on Western Europe. CAP is an instrument of the European Union but is

implemented by governments of the different member states according to their needs. The main aim is that of protecting and supporting farmers' income whilst encouraging them to produce high quality products with renewable and energy friendly sources (EU, 2010). Nonetheless, the initial role of CAP was to encourage a better agricultural productivity, provide a good food supply at affordable prices and promote a proper agricultural sector within the EU.

CAP offered subsidies and systems to guarantee a high income to farmers, thus providing incentives to produce more. Financial aid was also given for farm restructuring (farm growth and management technology skills). From the 1980s onwards, CAP started moving EU towards self-sufficiency. This led to an almost permanent surplus of major farm commodities, creating 'beef mountains and wine and milk lakes' (EU, 2010). Some of these were exported with the help of subsidies and others had to be disposed of within the European Union. These measures brought high budgetary costs and distorted world markets. They did not always serve the best interests of farmers and quickly became unpopular with consumers and taxpayers. At the same time the Rio Summit (1992) brought about concerns on the environmental sustainability of agriculture. Therefore the CAP had to change its course (EU, 2010).

Many changes were already established by the 1980s such as production limits, e.g. milk quotas, which helped to reduce surpluses. In the 1990s the emphasis was more oriented towards protecting the natural environment by using sound farming techniques. This emphasis came into effect back in 1999 with the Agenda 2000 reform. This reform brought about competitiveness of EU agriculture, a rural development policy encouraging many rural initiatives and helped farmers restructure their farms to diversify and improve product markets. A ceiling on the budget allocated to agriculture gave a guarantee to tax payers that CAP will not run out of control again.

Today farmers are not just paid to produce food. CAP is demand-driven and takes consumers' and taxpayers' concerns fully into account. Previously the more farmers produced, the more subsidies they were given. Today this has changed and subsidies are given independently. Farmers still receive direct payment as an income but this is not related to their total agricultural produce. Additionally, farmers now have to take care of the surrounding environment, ensure animal welfare and reach food safety standards. Failing to do so means a reduction in their direct payment. The fact that income is not related to the total agricultural produce helps farmers become more market oriented while it allows them to produce whatever is most suited but are still assured a stable income.

3.5.2 Emphasis on quality, organic farming and care for the environment

The EU encourages best quality production amongst the rural community by using various methods and tools including quality labelling. The CAP issued the first quality label for wine in the 1980s. This was in time extended to the olive oil, fruit and vegetables sectors. The EU recognises the fact that consumers are very much interested in the geographical origin of food and related characteristics, thus three logos have been issued. These are the Protected Designation of Origin (PDO), Protected Geographic Indication (PGI) and Traditional Speciality Guaranteed (TSG) (Fig. 3.1).



Fig. 3.1: EU logos for geographical origin of food and related characteristics
(Source: European Commission, 2010)

A PDO logo indicates that a particular product has proven characteristics solely from that terrain and the abilities of producers in the region of production with which it is associated. A PGI logo has specific characteristics or reputation associated with it. The product is related to a particular area and must have at least one stage of production take place on the same terrain. A TSG logo is used for products with distinctive features. These products have traditional ingredients, and/or are made in a traditional manner. The main advantages of having the protection of these quality indicators include a guarantee of the method and origin of these products, the effective high value marketing effect that such guarantees have and the protection of rural businesses against fraudulent imitations. By spring 2008 the EU registered a total of 785 PDOs, PGIs and TSGs (EU, 2010).

The EU is also working hard to help farmers understand the importance of converting to organic agriculture. According to the EU:

“organic farming is the production methods that maintains soil structure and fertility, promotes a high standard of animal welfare, and avoids the use of products authorised in conventional agriculture, such as synthetic pesticides, herbicides, chemical fertilisers, growth promoters such antibiotics or genetically modified organisms.”

(European Commission, 2010, pp 11)

Farmers should adopt techniques that are ecosystem friendly and reduce pollution. Only a limited number of processing aids and additives are allowed in organic farming processing policies. This gives a guaranteed authenticity to organic products wherever they are produced, ensuring that the labelling of organic products is accurate. This is further sustained by EU law where the use of the term *organic* is solely reserved to organic farming. In 2007, the area in the EU under organic farming accounted for 4.1% of the Total Utilised Agricultural Area (Eurostat, 2010).

An organic logo is also available for organic farmers and organic food producers although this is used on a voluntary basis (Fig. 3.2). The logo indicates to consumers that 95% of the ingredients found in that product have been produced organically, that the product itself has been inspected by the concerned authorities and finally that the product has the name of producer, the vendor and name or code of the inspection authority.



Fig. 3.2: Organic EU Logos, old and new (Source: European Commission, 2010)

EU rural territory covers approximately 90% of its total area, with more than half of it being farmed (Eurostat, 2010). This has a profound influence on the surrounding natural environments. Farming helped to protect a variety of semi-natural habitats and today these are significantly important to the ecology of the area and are home to a variety of wildlife species. All this has been encouraged by the agro-environment measures supported by EU which started in 1992 with the new CAP reforms. These schemes encourage farmers to provide environmental services and protection. Basic legal standards have been consolidated in the Rural Development Policy for the period of 2007-2013 where payment is made to farmers willing to voluntarily protect the natural environment (for a minimum period of 5 years) (Eubusiness, 2010). The CAP gives financial assistance to farmers who leave field boundaries uncultivated for migratory species, reduce the number of animals per hectare to reduce stress on land, create ponds or other natural features, and plant trees and hedges. The EU helps with the cost of nature conservation and insists that farmers must respect environmental laws (public, animal, plant health, food safety laws) and look after their land properly. In addition to this the EU has issued a law on Genetically Modified Organism (GMOs) since the early 1990s to protect citizens' health and the environment (European Commission, 2010).

Food safety for the EU starts on the farm itself and rules established, known as the ‘farm to fork’ rules, show whether food is produced in EU or is imported (CAP, 2008). There are four main aspects that are important to EU with regard to food safety. These deal with safety of food and animal feed, scientific advice, process control and consumer right of choice. All products must meet strict health requirements before being traded within EU countries or exported.

International Federation of Organic Agriculture Movements sets Basic Standards for Organic Production and Regulations, which are continuously monitored and adapted to research carried out on such issues (Helga and Youssefi 2010). These standards include:

Table 3.3: Basic Standards for Organic Production and Regulations adapted from Codex Alimentarius (Source: FAO, 2010)

In an area of crop production	In an area of livestock production
Use of natural manure.	Enough space for free range animals.
Crop rotation including legumes that fix nitrogen back in soil.	Organic animal feed.
Composting on site.	Ban on artificial additives and growth promoters such as antibiotics and GMOs.
Natural pest control through mulching, cover crops, companion crop planting, natural pesticides and biological control.	Adopt natural medical remedies.
Mechanical weed control.	Use of chemical allopathic treatments are allowed only under strict conditions and control.
Setting of buffer zones to isolate farm from airborne and leached chemicals.	Management schemes of manure to avoid contamination.
Protection of natural ecosystems.	

3.5.3 CAP - promoting trade and generating work

According to EU demographic statistics, 60% of the population of the 27 member states live in rural areas (Eurostat, 2008). Farming and forestry are the main land uses in these localities, forming the basis for a strong social fabric, economic viability and resource and landscape management. In February 2006, the EU members ratified a Rural Development Policy to help rural areas respond to social, economic and environmental issues. This new legal framework and the European Agricultural Fund for Rural Development help to stimulate growth and generate employment in rural areas and improve sustainable development. The Rural Development Policy for the period 2007-2013 is based on three main themes, namely: improving the environment, supporting land management and improving the quality of life and diversity of the economy in rural areas (Eurostat, 2008).

Assistance provided to farmers and others through these rural development measures include: training in new farming techniques and rural crafts, assisting young farmers to set up farms and older farmers to retire, modernising farm building and machines, assisting farms in meeting EU standards, helping to establish food processing facilities on the farm so farmers can increase income, improve product quality and marketing, setting up producer groups in new member states, supporting farmers in mountainous areas and related landscapes, renovating village and rural facilities, encouraging tourism, protecting and conserving rural heritage, taking the right agro-environment measures and developing the right strategies by local action groups.

Back in May 2004 Malta, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia joined the EU. This enlargement brought more political stability and security as well as an expansion of the internal EU market from 380,000,000 to nearly 500,000,000 people. This also brought dramatic impacts on EU agriculture strategies. 7,000,000 farmers were added to the 6,000,000 farmers of the former fifteen member states. This enlargement also added 55,000,000 hectares of agricultural land to the 130,000,000 hectares in the former EU (Eurostat, 2010). Farmers of new member states now have access to a single EU market and thus benefit from its rather stable prices, direct payments and rural development measures.

EU is a major partaker in the global agricultural trade and plays a leading role in establishing global trade agreements in the World Trade Organizations (WTO). The EU is also committed to the Doha Development Agenda (DDA) which aims at further liberalization of trade and enhancing development. In addition the European agriculture is a major player in the world's agricultural markets and is the second largest global exporter (€72.553 billion in 2006) and the biggest importer from developing and

least developed countries (€67.876 billion in 2006 - greater than USA, Japan, Canada, Australia and New Zealand together) (Eurostat, 2008).

The CAP aims to change its strategies in order to promote sustainable agriculture in a global environment. It seeks to be a living policy which reflects needs and expectations of European society, promotes a sustainable agriculture offering safe quality products and environmental protection, supports farmers in being suppliers of public goods to society, promotes the growth and creation of jobs in rural areas, reinforces competition and innovation in agricultural sector that respond to world market challenges and finally manages simple and transparent rules (CAP, 2008).

3.4 Sustainable agriculture in Malta

3.4.1 Ministry for Resources and Rural Affairs (MRRA): Organic Farming

MRRA set the Organic Farming Unit within the Department of Agriculture of Malta in October 2003. Its aim is to organise the Maltese organic farming sector and promote the subject through:

- Encouraging organic farming in the Maltese Islands.
- Identifying potential sites where organic farming can be carried out successfully.
- Introducing legislation which will allow certification in the Maltese Islands for the first time.
- Dealing with the European Commission, in particular fulfilments expected by the community regulation 2092/91.
- Supervising the inspection and certification bodies.
- Controlling imports of organic products from third countries.
- Growing an experimental plot of land with organic products.

(MRRA, 2010)

3.4.2 The Malta Environment and Planning Authority (MEPA) v.s. sustainable development.

The Malta Environment and Planning Authority (MEPA) is the national agency responsible for land use planning and environmental regulation in Malta. Both the Environment Protection Act (2001) and the Development Planning Act (2002), which govern the workings of MEPA, follow sustainable development principles, with sustainable development defined as the need to develop one's potential whilst taking into consideration the needs of future generations. In its policies and decisions MEPA

works to promote social and economic development together with the enhancement and protection of the environment and society (MEPA, 2010).

3.4.3 The Malta Standards Authority (MSA)

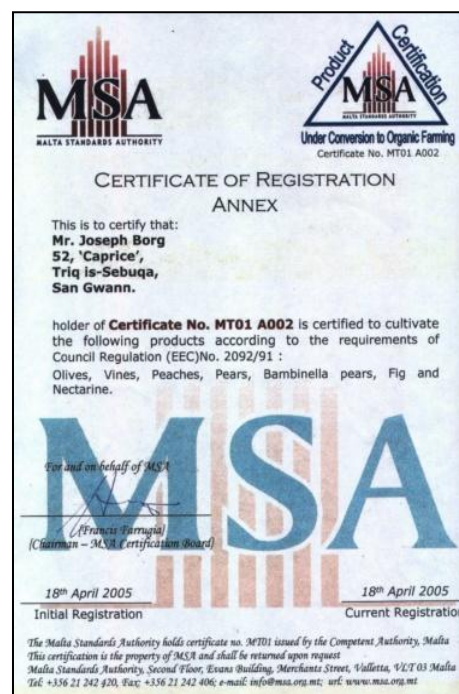
Certification is currently the responsibility of the Malta Standards Authority (MSA), which is a parastatal organisation. It follows the European Union Regulation on Organic Farming (EEC Reg. 2092/91) to set standards in environment and organic farming, pesticides and healthy products, disseminate information, monitor products and educate the public.

The conversion process to organic farming involves a two-year transition period before sowing annual herbaceous crops and three years before harvesting perennial crops. Assessment is carried out on field history, pedological situation, social-environmental situation, operators' awareness and know-how, equipment on farm and willingness to invest. Once a farm is certified (Fig 3.3), inspections are carried out on a regular basis to ensure the continuous quality of the product (Vizioli, 2000).

Organic farming is an emerging practice in the Maltese Islands. As at end 2007 there were 12 certified producers of organic products in the Maltese Islands (Table 3.4) covering 17.3 hectares, representing 0.17% of the Utilised Agricultural Area (UAA) and 0.15% of total agricultural land. It is estimated that 40% of this land is used for the production of olives, 23% for the production of fruit and berries, 12% for the production of vegetables, melons and strawberries and 10% for the production of grapes. The 14% decrease in organic farming between 2006 and 2007 is mainly attributed to a decrease in land used for olive plantations (NSO 2007).

Table 3.4 Organizations certified by MSA to Council Regulation EEC 2092/91 - Organic Farming (Source: MOAM, 2010)

Organization	Certificate Number
Mary Mallia	MT01 AB001
MRRA <i>Ghammieri</i> Farm	MT01 AB002
Wigi Farrugia	MT01 A001
Joseph Borg	MT01 A002
Gaia Foundation	MT01 AB003
Ruben Curmi	MT01 B001
Mario Grech	MT01 A003
Joseph Borg	MT01 B002
Josephine Humphreys	MT01 A005
Koperattiva Socjali Francosi	MT01 A004
Joseph Sciberras	MT01 AB004
Charles Vella	MT01 AB005

**Fig. 3.3: MSA Certificates of Organic Farming (Source: MOAM, 2010)**

3.4.4 Permaculture in the Maltese Islands through the Malta Organic Agriculture Movement (MOAM)

MOAM is an NGO set up in 1999 to promote Organic Agriculture in Malta. Its members include farmers, consumers, technical people and many others who have the local natural environment at heart. Its main aims are to:

- educate farmers and the general public about organic farming,
- share ideas and methods of organic farming,
- embody these organic principles both locally (in parliamentary circles, administration and policy making) as well as internationally,
- set up and update Organic Agriculture standards for Malta,
- co-ordinate product certification.

According to MOAM:

“Permaculture takes the notion of organic farming to the holistic limit by harmonizing human activity into the, inherently, sustainable nature of the natural world ... organic farming should be designed to work in a permaculture setting.”

(MOAM, 2010, pp1)

MOAM suggests practical ways on how a Maltese farmer should convert to permaculture, mainly through adopting polyculture techniques adapted to the Maltese ecosystem and climatic conditions. Suggestions include the preservation of indigenous vegetation, rearing of free range local farm animals, installing solar and wind energy devises, greenhouses, solar water heaters, compost toilets, vermicomposting and grey water purification systems. Rainwater is to be collected and stored in reservoirs and rubble walls are to be well maintained to minimize soil erosion and control land degradation (Mallia, 2000). Thus, the farm would be self sustainable and energy efficient.

“Permaculture is a philosophy pertaining to land-use and life style options that use natural resources in a sustainable way that guarantees our healthy survival and that of future generations. It follows that Permaculture is ethical and moral, not to mention intelligent. Permaculture is respectful of life.”

(MOAM, 2010, pp 1)

3.4.5 Revival of indigenous trees through organic farming: BIOLMED Project

BIOLMED is an EU project (funded by the European Regional Development Funds - ERDF) oriented towards the revival of indigenous olive trees in the Mediterranean basin for a quality type of olive oil making by using organic farming methods (BIOLMED, 2010). BIOLMED is a transnational networking project for enhancing the Mediterranean organic olive-growing competitiveness. It started on 3rd March 2010 and will finish on 1st March 2011. It incorporates an integrated management system on organic product quality and favours the purchase of products directly from local farmers (Group Purchasing Organisation and Farmers Markets models).

The project involves four countries of the Mediterranean - Italy, Spain, Greece and Malta. These work together to improve their business strategies, understand new scientific innovations, improve product quality and compare results with field operators and public institutions.

BIOLMED is a sustainable venture in line with EU regulations as it:

“encourages the development of organic farming because its actions target on improving the soil fertility for future generations, ensures the increase in employment chances for young people and the respect of equal opportunities.”

(BIOLMED, 2010, pp 3)

3.4.6 Revival of the Indigenous Olive Tree: PRIMO Project

PRIMO (Project for the Revival of the Indigenous Maltese Olive), funded by the EU through BIOLMED, was launched in November 2006 with the intent of conserving and reviving Maltese indigenous olive varieties. The main aim is to study the characteristics of old Maltese olive tree varieties that have been discovered, such as the Bidni and San Blas, and to propagate these varieties which date back approximately 1500 years (MRRA, 2006). Olive pips are collected from the indigenous olive grove found in Bidnija. These are taken to *Għammieri* where they are sowed in nurseries, left to germinate, and are used as rootstocks. Cuttings are later taken from the Bidnija olive grove and grafted to these rootstocks. PRIMO project is co-financed by a private stakeholder (Sammy Cremona), a local bank (Bank of Valletta) and the MRRA (BOV, 2006). The MRRA is carrying other tests at *Għammieri* experimental farm in Marsa, where about twenty other varieties are being tested for their adaptability and suitability to the Maltese Islands. These include the Ottobratica, Pasola, Bosana, Sant' Agostino, Nocellara Messinese, Bianca Lille and Manzanella.

3.4.7 Maltese tree varieties in permaculture farm designs

Farmers need to integrate their available resources on their farmland to be as energy efficient as possible. Apart from using seasonal crops agroforestry and permaculture techniques, such as crop rotation and companion cropping, farmers on the Islands need to look at other economically potential resources which were fundamentally important prior the 1950s but which are mainly forgotten today, including the Olive, Carob, Pomegranate, Fig, Almond and Prickly Pear. Apart from increasing the farmers' potential economic output, they will provide a wider habitat, different microclimates, and help control pests and diseases.

3.4.7.1 Olive trees (*Olea europaea*)

Adopting permaculture practices involves identifying indigenous varieties that have the best adaptability to the Island's microclimate and soils. The characteristics of the olive trees are ideal for permaculture farms, land protection and soil conservation (CIHEAM/IAM-B, 1999). A case in point is the Bidni variety, which is a vigorous grower and of a strong constitution. Tree leaves of this variety are typically broad and short and the fruit is rather small with a comparatively small stone. Even though the olive *per se* is small it produces high quality olive oil which is very rich in flavour and ideal for 'piccante' oil. The tree and fruit are resistant to pests and diseases. In fact, it is the only variety that is not affected by olive fly attacks, thus allowing the fruit to ripen for longer periods achieving larger amounts of oil. The Bidni olive ripens around the end of October-beginning of November and turns a dark violet at maturity. Fruit picking is carried out between end of September and beginning of October when the olive starts to change its colour and oil percentage is at its best. The Bidni trees are still in production today, albeit not on a large scale (MRRA, 2005).

A survey undertaken in the 1920s documented other olive tree varieties. One of the mostly widely spread was that of the Maltese Olive, which was a fair sized tree of a strong constitution. Leaves were broad and fruit elliptical in shape. These matured around November-December and were mainly used for olive oil production (Borg, 1923). Other varieties named include Marsala olive, Sicilian olive, Verona olive, Frontoglio olive, French olive, White olive, Spanish olive and Large Almond Shaped olive. Today, the most common varieties imported from Italy include Frantoio, Leccino, Carolea, Coratina, Pendolino and Cipressino for olive oil production and Uovo di Piccione and Bella di Spagna for table varieties (BSS, 2009).

3.4.7.2 Carob Tree (*Ceratonia siliqua*)

The Carob tree needs little water and can adapt to a wide range of soil types, from poor sandy soils to rocky hillsides and to deep soils. Its value was discovered by ancient Greeks who imported it from the Middle East into Greece and Italy (Zografakis, 2000). It was then spread around the Mediterranean region by the Arabs especially around the Northern coast of Africa, Spain and Portugal. Later on it was also disseminated in other continents such as America (California and Arizona) and Australia (South Eastern and South Western parts). Today this tree forms an important component of the Maltese ecology and its cultivation in calcareous soils is extremely important, both environmentally and economically (Zografakis, 2000) (Table 3.5).

Table 3.5 Carob bean gum uses and technical applications (Source: Batlle and Tous 1997)

Industrial use	Applications
Pharmaceuticals	Anticoeliac products, pomades, pills, toothpaste
Cosmetics	Emulsions and foams, shaving foam
Textiles	Colouring thickener
Paper	Flotation product for recovering material; thickener for surface treatment
Chemicals	Glues, colouring, polishing, dyeing, matches, pesticides
Petroleum	Flocculation additive to increase stability and thickness of welling
Mining	Flotation product
Well sinking	Wall reinforcement, moisture absorbent
Concrete	To strengthen solidification
Explosives	Water binder for explosives

Due to the fact that low orchard management requirements are needed, the carob tree is suitable even for part-time farming and shows potential for planting in semi-arid Mediterranean and subtropical regions. However, carob orchards are known to be slow in production, which is one of the fundamental reasons why fewer farmers opt to plant this tree on their land.

3.4.7.3 Pomegranate (*Punica proto-punica*)

Pomegranate is a native tree that originated from Iran to the Himalayan foothills in Northern India. It was then cultivated and naturalized over the whole Mediterranean basin thousands of years ago. The pomegranate prefers a semi-arid, mild-temperate to subtropical climate and is naturally adapted to mild-wet winters and hot-dry summers. The tree may start its fruit production after its first year

although the second to third year is more common. The fruit matures after 5 to 7 months. Fruits grow in size depending on the humidity of that particular season. This tree can be damaged by severe temperature fluctuations. (CRFG, 2010).

For the best produce pomegranates should be placed in the sunniest and warmest parts of a field, orchard or plantation. It is also considered as an excellent plant for landscaping purposes. It does best in well drained soils but it also thrives in calcareous, acidic or rock strewn gravel. Moreover, fertilizers are only needed for the first two springs and little is needed afterwards. Annual mulch of manure or compost is still used to better sustain the pomegranate tree. Pomegranates are also free of most pests and diseases although problems may include leaf and fruit spot and foliar damage by white flies, bugs and scale insects (Lye, 2008).

3.4.7.4 Fig Tree (*Ficus carica* L.)

It is believed that this tree is indigenous to Western Asia and was distributed by man throughout the Mediterranean area. It was found amongst archaeological excavations and dates back to 5000 B.C. The fig grows mainly in dry and warm temperatures such as the Mediterranean (CRFG, 1996). Diseases may be devastating to the fig tree but if killed to the ground they will normally re-sprout from the roots and can be grafted as they reach adequate size.

Fig leaves are bright green, single, alternate and large up to 30 centimeters in length. The tiny flowers of the fig are hidden inside the green ‘fruits’ technically known as synconium. Pollinating insects gain access to the flowers through very small openings at the apex of the synconium. The common fig tree bears a first crop known as the *breba* crop in spring and a second crop in the fall of the new growth known as the main crop. The mature ‘fruit’ has a tough peel (pure green, green suffused with brown, brown and purple) then cracks upon ripeness. The interior is white and contains a seed mass bound with jelly-like flesh. These seeds are numerous and edible. If well presented in containers the figs are eye catching and can be very profitable. Figs can also be sun dried and packed or further prepared with spices and liquor.

Fig trees require long hours of sunshine for its fruit to ripen. The tree becomes enormous and will shade anything growing beneath. The roots are greedy, travelling far beyond the tree canopy. Young fig trees should be watered regularly until fully established, at least once a week in the Maltese climate.

Heavy pruning is needed only during the first few years. As regards fertilizers, figs need to be fertilized regularly if in pots or when they are grown on sands. However, an abundance of nitrogen encourages growth at the expense of fruit production, therefore fruit ripens improperly (CRFG, 1996).

3.4.7.5 Almond (*Prunus dulcis*)

The origin of almond trees lies in the Middle East and South Asia, which then spread to North Africa and along the Mediterranean Sea. This tree is deciduous, meaning it sheds its leaves seasonally. It reaches an average height of approximately 10 meters and has a diameter up to 30 centimetres. The leaves are between 2.5cm to 12cm. White or pink flowers, having a diameter of 3-5cm, blossom in early spring. There are two forms of the plant, sweet and bitter, and both fruits are drupes, not classified as nuts, consisting of an outer hull and a hard shell containing the seed. Almond trees reach peak production when they are 6 to 10 years old but continue to fruit for 50 years, longer than any other fruit tree (Rieger, 2006). They are very resistant trees and can survive long dry seasons, and are highly used by farmers to craft other fruit trees from them.

Its oils were used in medicines but are no longer prescribed. Its essential oils are used as an emollient for massages, and as a wood conditioner of certain woodwind instruments. Almond is very popular in sweet and savoury dishes, is used to make flour, and has various health benefits, including providing a source of vitamin E (White, 2006), lowering LDL cholesterol, improving complexion and helping the movement of food through the colon (Porter, 2002).

3.4.7.6 Prickly Pears (*Opuntia ficus-indica*)

The prickly pear's cacti origins lie in South America, but has adapted to the semi arid and arid conditions of the Mediterranean basin and North Africa and is a long-domesticated crop plant important in agricultural economies throughout these areas. Most types of prickly pears cactus require well drained soils in dry, rocky flats or slopes. Others, however, prefer mountain foothills. They vary in height from an average of half a meter to two metres, pads vary in width, length, shape and colour. The prickly pear is a cactus that has flat, fleshy pads that look like large leaves. These pads are actually modified branches or stems that serve several functions, including photosynthesis, water storage and flower/fruit production. These types of cactus have large spines which are considered modified leaves. Prickly pears are members of the *Opuntia* genus and are unique due to their fine and tiny spines known as glochids (Wiese *et al*, 2004). In Malta prickly pears are sometimes used as wind breaks and as a hedge to separate fields from one another, especially terraced fields.

Its fruit can be red, deep wine-red, green or yellow orange. It is sweet and moist with a flavour similar to sub-tropical fruits like watermelons, strawberries and figs. It has to be peeled carefully to remove

the small spines on the outer skin before consumption. This fruit it is often used to make jelly and candies. The fruit is also a favourite ingredient in Sicilian cuisine (candies, ice cream, granita and jellies) and Mexican cuisine where it is known as ficcudinia and ‘taccos de nopales’ (eggs with nopal) respectively. Maltese chefs value this fruit and it is on the increase on menus too. In Malta it is enjoyed as a summer fruit, used in ice creams and also to make popular liquor known as *Il-Bajtra*. Prickly Pear nectar is produced from the pulp of the fruit and mixed with juices.

Recently there has been a medical interest in the prickly pear plant. Studies have revealed that the pectin contained in the prickly pears’ pulp lowers levels of ‘bad’ cholesterol while leaving good cholesterol level unchanged (ICP, 2010). Other studies have shown that the fibrous pectin in fruit may lower diabetic needs for insulin. Furthermore, prickly pear’s extract is known to reduce the severity and occurrences of hangovers if taken in advance of alcohol consumption. Nausea, dry mouth, appetite loss, and alcohol-related inflammation were all reduced in people who ingested prickly pear extract five hours prior to drinking. Prickly pears are also rich in vitamins (A, C, K, riboflavin and B6) and minerals (magnesium, potassium, manganese, iron and copper). They have high calcium content too. According to Reuters, some 10,000 farmers cultivate nopal in Mexico producing around \$150 million worth of it each year. In Malta a particular Maltese company, ICP, together with a French partner, has been researching the *Opuntia ficus-indica* properties since 1996. It has been found that its extracts can help alleviate symptoms of extreme fatigue experienced by scuba divers and racing drivers (ICP, 2010).

3.5 Farm design based on permaculture principles

“Permaculture farm design is mainly an integration of concepts, technologies, techniques and strategies which function as an interrelated system like organs in a body.”

(Mollison and Holmgren, 1978, pp 5)

Permaculture design systems try to link many aspects, including fabrication, natural, spatial, temporal, social and ethical issues, to create a balanced natural system and seek to provide a secure and sustainable place for living organisms on earth. Permaculture design is further subdivided into two:

- *Functional Design* states that every component within the design should function in many ways and should support all other components; and

- *Flexible and Conceptual* type of design accepts modifications through experience and accepts contribution from any direction (Mollison, 2002).

According to Mollison and other permaculturists, farm design is further subdivided into categories including:

a) Analysis

This system follows the principle of self-regulation. This involves reaching a balance between all components (Yeomans, 1973). Each element (building, animal, garden, farmer, etc) needs certain inputs and has multiple functions. In a good design, products of one element become inputs to another and each function (e.g. food, warmth, shelter, storage) is supported by a number of elements.

b) Observation

Field observation is of utmost importance for dependability and relevance. It is unscientific and individualistic but will see all the relevant components and events to devise a 'least change' approach to save energy and time (Fukuoka, 1978).

c) Deduction from nature

Natural farming as first discussed by Masanobu Fukuoka (1978) involves getting into a natural synchronisation with nature. Farmers let their own senses (wind chill, heat, etc) and the organised, patterned or measured information extracted from observation, lead them to a better understanding about natural processes. After such understanding, the following ideas must be adapted to the farm's needs:

- i. *Structure*: Imitate the structure of the natural system into the designed plot. Integrate endemic flora and fauna, and experiment with new species if the local ones are impoverished through time.
- ii. *Process*: Study the flow of energy and the natural processes of the area and imitate them.
- iii. *Landscape*: Use the different microclimates of each site to its best potential to increase the natural diversity and richness.
- iv. *Philosophy*: To become a good designer is to be in search of an understanding of nature and to be content with the search itself.

d) Options and decisions

Designing a selection of options is very important to make a sustainable farm, however this is a continuous process and is not an end in itself (Law, 2005). Choosing one design does not automatically wipe off all other ones but options open up or close down depending on the output

reached. This approach covers the natural, socio-economic and legal restraints not dealt with by other approaches.

e) Data overlay

A good site map makes any landscape design much easier and more visual by indicating a lot of sensible options, e.g. dam sites, soil/crop suitability.

f) Random assembly

This method involves listing at random all the components (inputs, processes, outputs) that will be developed in the farm, and trying to find solutions to them. These answers can also be found by constantly re-examining a problem and considering every form of solution, including that important strategy of doing nothing (Fukuoka, 1978).

g) Flow diagrams

Once the processes that will be taking place in the farm are understood, a flow diagram can be designed to illustrate such process; then the farm can be structured according to this diagram (see Chapter 5. Fig. 5.7). Normally, such task is best managed by an experienced worker.

h) Zone and sector analysis

Particular attention must be given in locating the needed components in relation to the energy source. Following Mollison (1988), these energy sources are divided into two:

- i. *Energy available on site*: Manpower, machinery, water and fuels. For all these, zones are established in order to determine their use, access and time available.
- ii. *Energy flowing through site*: Wind, water, sunlight and fire, organised in sectors

Zones are viewed as a series of concentric circles where the inner part is the most frequently visited and vice-versa

Sector analysis is more site specific than zoning and is used to capture, block or screen out incoming energy or channel it to specific uses. Zones in this sector analysis can be rotated accordingly. This guarantees that all components selected will work to govern sector factors and thus all components are well placed. The two systems are then combined to form a spider web of placements putting all main systems in the right place in terms of energy analysis (Fig. 3.4, Fig. 3.5). . This means that the sector analysis concept needs to be adapted to make the permaculture design function as natural as possible.

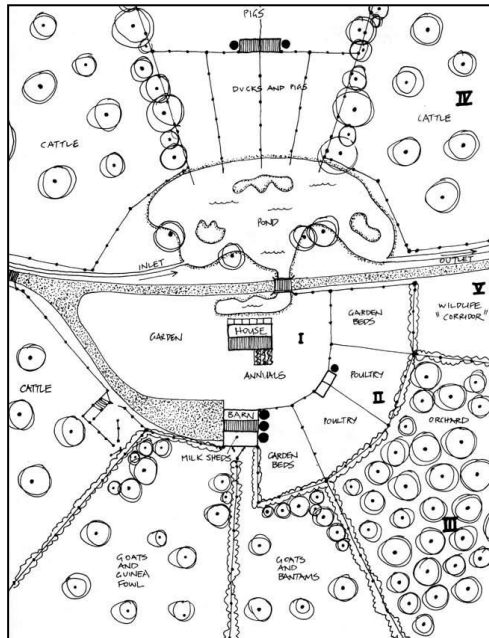


Fig 3.4:Ground Plan for a Mixed Small Farm

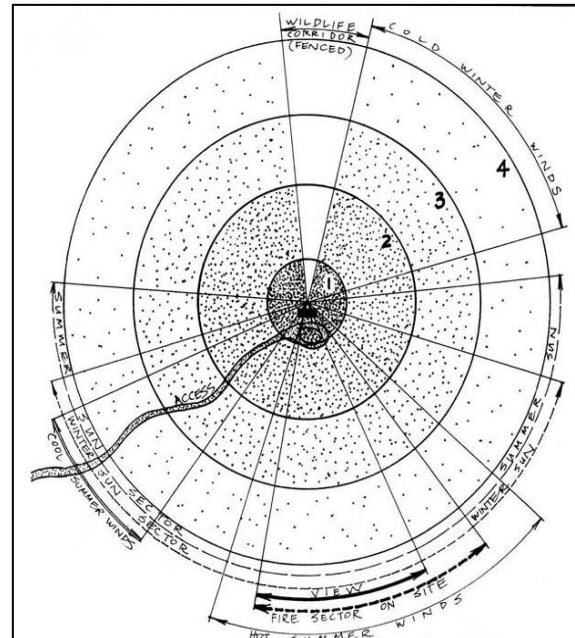


Fig 3.5: Zone and Sector model

(Source: Mollison, 2002)

Chapter 4: Methodology

4.1 Rationale

This chapter will examine the research methodology employed in this study. It will first look into the choice of the research question and the objectives followed by what the research question aims to achieve. It will show how triangulation was engaged and further discusses the interviews carried out. The limitations of the study will also be discussed in the last section of this chapter.

4.2 Method Selection

4.2.1 Triangulation

In order to test the research question it would be advantageous to try and combine more than one form of data collection. This practice is better known as triangulation and is used to obtain either formal or informal settings and verbal or non-verbal responses. The combination of the two settings and the two types of acts results in the four major forms of data collection, namely observational methods, survey research, secondary data analysis and qualitative research (Nachmias and Nachmias, 1996). All these were triangulated so as to obtain a better understanding of the state of the farming industry in Malta.

4.2.2 Qualitative study

In order to answer the question ‘Why do few farmers try practicing Agroforestry and Permaculture principles in Malta?’ an in-depth analysis of what influences the farmer’s everyday decisions, perception, ideologies, tradition, working methods and farming processes is needed (Nachmias and Nachmias, 1996). This leads to a qualitative research method approach that has unrivalled capacity to constitute compelling arguments about how things work in particular contexts. Qualitative research differs from quantitative research in that it seeks to understand the socially constructed reality rather than finding the ‘one reality’ of postpositive quantitative methods (Silverman, 2006) It tries to evaluate individual’s voices and capture their point of view through detailed interviewing and observation. It also examines constraints of everyday life and the social world.

“The main strength of qualitative research is its ability to study phenomenon which are simply unavailable elsewhere”

(Silverman, 2006, pp 43)

Qualitative methodology lends itself perfectly to such a study as most farmers would normally be reluctant, for one reason or another, to fill in a questionnaire. Ideally, one to one interviews with farmers would be more acceptable, especially if delivered on site, over an informal cup of tea and more conducive to earning their thrust. During qualitative interviews certain knowledge or skills can be retrieved as words come out naturally. This could serve more the scope of this dissertation. Knowledge retrieved from farmers could throw light upon some new ideas and concepts which could be included both in the dissertation and permaculture designs. These include past practices which have been lost due to modernisation. Finally, the researcher could come across farmers who have done informative courses regarding the use and abuse of insecticides and/or pesticides and already practices agroforestry and permaculture principles.

Qualitative researchers believe that rich descriptions of the social world are valuable, whereas quantitative researchers presenting statistics are less concerned with such description details (Nachmias and Nachmias, 1996). In an ideal situation, with more time at hand, both methods would have been applied to gain a wider perspective of the whole farming situation in Malta but, considering the limitations of the study, only in depth interviews methods were opted for. The result of a qualitative study does not indicate the farming population perception *per se* but only the scope of possible matters on a subject. Since the main objective of this study is to gather the relevant information on the nature of farmers' will to convert to permaculture practices in Malta - and not necessarily how many people would agree on the problems - this qualitative method was deemed most suitable (Huysamen, 1993).

4.3 Research Procedure

4.3.1 Case Study

An instrumental case study was chosen by information-oriented sampling (Flyvbjerg, 2006). This was done to provide an insight into how a local full-time farmer is trying to integrate Permaculture and

Agroforestry principles in his field. This was followed by a field design using the same principles and is discussed in Chapter Five. Methods of analysis of the farm included using the Vensim System Thinking Simulation Model to create a visual plan showing an organic agricultural scenario in Malta, with the related governing bodies investing in permaculture for a sustainable future. A flow diagram was also designed to show the inputs, processes and outputs which will be implemented by the owner of the farm once the permaculture farm will be fully functional. Field visits, observations and consultations with the project architect were also carried out. A field sketch and cross-sections of this permacultural design were created following Mollison's Zone and Sector Analysis.

Permaculture methods have to be adapted to each location. Ideally, a personal field experimental study is carried out; however, this would require a minimum of 6 to 10 years of field work, proving not to be feasible for the purpose of this study. Thus, the second best option was taken, i.e. identifying a local farm that is converting to permaculture, analyse it in relation to the permaculture literature and put it in the Maltese scenario.

4.3.2 Personal Interviews

A personal interview is a "face-to-face" interpersonal role situation in which an interviewer asks respondents questions designed to elicit answers pertinent to the research hypothesis (Nachmias, 1996). In-depth semi-structured interviews were conducted with farmers, departmental personnel and foreign experts. Interview questions were designed in an open-ended manner so as to facilitate farmers' participation who could contribute freely to the dialogue. A set of pertinent questions were designed and phrased ahead of time, to give a framework to the discussion; however this technique allows the flexibility needed to probe for details and discussion issues where needed. Moreover, it does not give the interviewee a sense of interrogation, but allows easy exchange of ideas, perceptions and comments.

These semi-structured interviews were planned to last around 30 minutes. The interview format was constructed in different sections so as to obtain as much information as possible. This format was based on secondary data which indicated where potential problems of Permaculture and Agroforestry in Malta laid. The NSO states that there are a total of 14,113 farmers on the Maltese Islands, 1,524 being full time and 12,589 on part time basis (NSO, 2003). For the purpose of my study, the North of Malta was selected as a cluster from which to elicit 26 farmer interviewees (mapped in Fig. 6.5). No formal list of farmers was obtained from the concerned authorities due to data protection restrictions.

This was counter-balanced by asking farmers themselves to indicate other farmers which would be willing to participate. This method is known as purposive sampling (Miles and Huberman, 1994). The total area of lands under study amounted to 672 Tumoli or 75 hectares (out of a total of 2,722 hectares of Northern agricultural land declared by farmers (NSO 2003)).

Five other interviews were carried out with departmental personnel of the MRRA, MSA and MEPA who were contacted by phone and email for an appointment. Structured open-ended questions were asked to gain an insight into the position that the Maltese Government is taking with regard to the agricultural sector, especially when considering the emphasis the EU is putting on the need to have sustainable farming and reduce monoculture techniques for a healthier living.

Two foreign experts having a professional background of organic farming were also contacted and interviewed to elicit their opinions and perspectives about the future of farming and permaculture in Malta.

When possible interviews were recorded on a cassette player and transcribed at a later stage. However, not all farmers felt at ease knowing that they were being recorded. In these cases points were taken and rewritten afterwards. Moreover, throughout all interviews observations were noted with regard to interviewees' attitude, implicit messages, equipment and methods seen on site.

4.3.3 Importance of a Pilot Study

A pilot study or a 'trial run' session was carried out at selected farms using purposive sampling. Two sessions were carried out, one at Mellieħa and one at Mġarr. This was done so as to test questionnaire wording, sequence and layout and to familiarise with respondents, test fieldwork arrangements, estimate response rate and interview duration, and also test analysis procedures (Veal, 1997).

It was noted that the original interview questions were too demanding for a 30 minute session. This would have required more time and could have negatively influenced farmers' participation by them getting bored. Time was a crucial factor that had to be considered since the interviews were, in the main, carried out after a long, hard-working summer's day for farmers. During the trial session it was deemed necessary to make minor amendments to the wording, format of particular questions and more importantly the length of interview.

4.4 Analysing Data

The N-Vivo is one of the most popular and widely available software packages for preparing and executing computerized data analysis (Nachmias and Nachmias , 1996). This computer software was used to help analyse data collected from the interviews and arrive at a more comprehensive understanding of the information obtained. Another tool used in the course of this study was Google Earth which provided detailed views of the Maltese terrain. Vensim Model was used to draw a simplified model of the farming situation in Malta to aid analysis. Field sketches were created following Mollison and Holmgren design methods. Data overlay included MEPA aerial photos, survey plans and photos taken on site.

4.5 Limitations to the Study

This study may have been somewhat restricted due to the limitations encountered in the course of the research. The first setback came right at the beginning when data regarding the number of registered full time and part-time farmers in Malta was requested from the relevant government department, the MRRA. Although no personal details were requested, the Director responsible for the *Għammieri* Government Farm was unwilling to forward the information requested in view of the provisions of the Data Protection Act. The data was of significant importance to the researcher and would have, no doubt, enriched the study.

Another limitation which may have somewhat restricted the study was the use of a tape recorder during interviews held with farmers. This was a two-fold problem since:

- i. Some farmers were ill at ease knowing that the interview was being taped and were unwilling to disclose information which, they believed, could be contentious. It was only after the recorder was switched off that crucial comments on the authorities such as the Malta Environment and Planning Authority and the Ministry for Resources and Rural Affairs were made. Furthermore, when direct questions concerning these authorities were formulated, most of the operators either switched to other arguments or simply refused to give an answer. This occurred despite the fact that it was clearly stated at the beginning of the interview that this information would remain confidential and that no individuals would be mentioned unless specific permission was given by the person concerned.

- ii. Some of the farmers were unwilling to have the interview taped therefore the responses had to be put down in point form. In this case, some of the information disclosed might have not been noted down.

Other persons from the MEPA, MRRA and MOAM were also interviewed in order to obtain a wider picture and have input from the diverse stakeholders that may influence the farming situation in Malta. All were initially very helpful in providing suitable information for this research study. On the other hand, the MRRA were unwilling to provide details about specific leading farmers. The MEPA helped in providing secondary data.

Another limitation is the sample size. It would have been preferable if the sample size was larger to get a more representative sample.

Not all chosen farmers were willing to answer the questionnaire. In a way this was unexpected since the general perception is that farmers often complain about the poor income they earn and the middle-man (*pitkala*). The unstructured interview would have served as a means for these farmers to air these negative views of farming in Malta.

Time limitations affected the actual observation period. Since this study was carried in the summer, dry months, few seasonal variation in crops and farming practices could be seen.

Chapter 5: Permaculture farm design: A case study at Mselliet, Mgarr

Permaculture design systems try to link all aspects, including fabrication, natural, spatial, temporal, social and ethical issues, to create a balanced natural system and seeks to provide a secure and sustainable place for living organisms on earth. (Mollison, 2002)

5.1 Adapting permacultural design to brittle environments like the Mediterranean area

“Setting land aside, leaving things to nature or completely resting land in a non-brittle environment is likely to lead to the development of a forest. In a semi-dry, brittle landscape, it is likely to lead to the generation of a desert!”

(Edge, 2009)

This is the recommendation of an experienced permaculture farmer working at Semilla Besada and trying to promote sustainable living in dry land environments through holistic management. Following Mollison’s research she explains how, in dry land, dead vegetation takes far too long to be decomposed and put back in the soil. This dead vegetation builds up and suffocates new growth in perennial grasses, making land unproductive, dead. Wind eventually blows away dead oxidised material, uncovering and eroding the soil, favouring desertification. Thus, grazing animals become highly important for the circulation of the nutrients, as they process vegetation through their digestive system and produce fertile manure that is reintroduced in the soil by creatures like the dung beetle (Edge, 2009). Such experiences show how important it is to thoroughly understand regional characteristics and adopt techniques that make sense in each scenario.

5.2 Understanding challenges in Malta

Maltese, natural climax ecosystem is woodland vegetation; however, most of the natural landscape was modified through the ages by various human activities as highlighted in Chapter 2. A general sketch of the Maltese present situation comprises a highly built up, densely populated island, where intensive farming is practiced in small-scale fields with the use of large amounts of chemical pesticides and fertilisers. Maltese soils are of young origin, many fields are terraced, and farmers have to make up for the relatively high annual humidity and evapotranspiration levels, together with sporadic rainfall (Chapter 2). Indigenous crops, such as the Bidni olive variety, have managed to

adapt to these circumstances and are of high nutritional value. Most Maltese crops are small but very tasteful and have a good nutrient value (Chapter 6). Nature in Malta seems to promote the idea of quality and not quantity. Supporting sustainable farming means understanding these characteristics and to try to mimic the natural trends.

5.3 Using Vensim model to simplify Maltese scenario

A Vensim model was created in order to understand the implications of a permaculture farm in the Maltese context in a simplified visual way (Fig. 5.1). The systems thinking behind this model help farmers understand complex issues involved in such a transition. This model can be changed and improved in time to adapt to the specific dynamics the farm will follow.

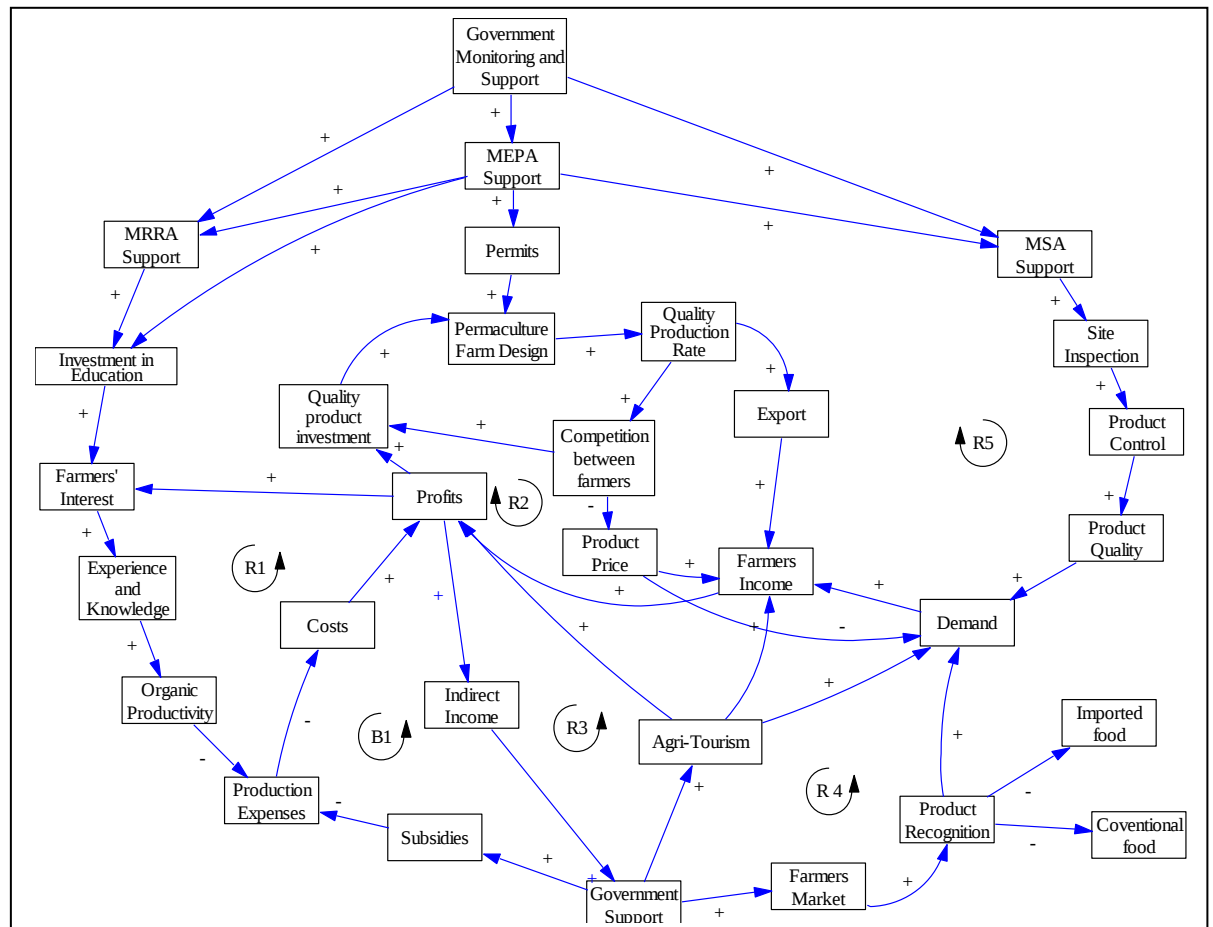


Fig 5.1: Vensim model showing an organic agricultural scenario in Malta, with the related governing bodies investing in permaculture for a sustainable future

Vensim model showing permaculture in Malta: Description

Reinforcing loops:

R1: MRRA gives support for investment in education and encourages farmers to convert to organic and follow permaculture views. This will instil more interest in farmers, who eventually will use their experience and knowledge to grow organic. Production expenses will be mitigated by subsidies from governing bodies. This will reduce costs and maximise profits, thus increasing interest amongst other farmers who will follow suit.

R2: MEPA helps organic farmers and issues the requisite permits. This would lead to more farmers implementing their farm design according to permacultural views, increasing quality production rates to a point where a farmer can export agricultural produce. This will increase the farmer's income, making it more profitable to reinvest in quality production rather than quantity.

R3: Agritourism, through government incentives, will increase demand, leading to more income for the farmer and therefore more profit. Government will also make indirect profits by attracting foreign currency into the country.

R4: If government increases farmers' markets, organic products will be more readily available to the public, increasing the probability of more people buying organic produce. This, in turn, increases demand resulting in profits for the farmer and in indirect profits for government.

R5: If government, through the MSA, increases control and farm site inspections, there will be more product control and quality products, increasing the demand for such desirable crops. This, in turn, will increase farmers' income and profit. Farmers will invest more in this method, improve their permaculture farm design, increase quality production rate, competition will reduce prices further more, and farmers can benefit from a new niche market sought after even from foreign countries.

Balancing Loops:

B1: If government temporarily subsidises farmers through EU incentives and initiatives in the initial stage of conversion, production expenses will be balanced, costs reduced and profits increased. In the long run, such profits would mean that government will have additional income from more taxes paid by farmers on higher incomes earned by them.

5.4 An attempt of permaculture farming in Malta in Mselliet farm, Mgarr

Permaculture is a concept originally derived from the words "permanent" and "agriculture" although nowadays it is often thought of as "permanent culture". The culture part is what tells us that permaculture is not just about gardening but it incorporates aspects such as self-reliance, finance and community amongst others. In fact, it is an integrated system based on careful observation of natural systems which ensures that ethics are met through caring about the earth, the people and creating a surplus to balance things out (Holmgren, 2002). This is what David Mallia and his wife Mary are trying to achieve in their permaculture farm in Malta.

David and Mary Mallia are owners of the only functioning permaculture farm in the Northern part of Malta. They believe that whilst organic farming is certainly practiced by permaculturalists, organic farmers are not necessarily permaculturalists. According to them, permaculture takes the notion of organic farming to a new level where it manages to integrate all components holistically with the natural world. They are active members of the MOAM and are licensed by the MSA as organic farmers and permaculture operatives.

Their farm, *Razzett il-Fuklar*, is situated in the Mselliet area, in the limits of Mgarr village on mainland Malta, and has an area of 30,964 m² (Fig. 5.2) This farm is designed to sustain a variety of crops and trees where fields are interspersed with natural ecosystems such as the garrigue. Farm animals are planned to be free range, diverse and limited in numbers. Electricity is generated on-site by renewable resources such as wind and solar energy, with the aim of installing new devices, including three wind turbines and two rotating solar panels. Rain water is collected in reservoirs and there is a plan to purify and reuse grey water for agricultural purposes.

The soil types found at *Razzett il-Fuklar* are Terra Rossa and Xerorendzina. Almost all fields are terraced and are adjacent to Mselliet Valley, a valley with an ephemeral⁵ stream flowing from the SW to the NE. This valley is an ecosystem full of flora and fauna, which in turn enriches the ecology of the area under study. Farmers in this area have dammed the valley to collect rain water for irrigation purposes. Slopes in this part of the valley are north facing and exposed to western, north-western, northern and north-eastern winds. Furthermore, they are sheltered from all southern winds due to the Great Fault to its south. This farm is built upon the Upper Coralline Limestone adjacent to a cliff face

⁵ Ephemeral Stream: an intermittent stream that flows only in the rainy season.

which is only few meters high and is surrounded by terraced fields found between 73.43 m to 103.99 m above sea level and has a slope gradient of 2° to 8°.

MEPA aerial photos show how the area of Mselliet has been transformed from 1967 to 2008 (Fig 5.3: 1967, Fig Map 5.4: 1988, Fig 5.5: 1994, Fig: 5.6 2008). The most prominent change that occurred involves the development of two privately owned schools (Fig 5.5 and 5.6), also shown in Fig. 5.2. This farm is located on an ODZ (outside development zone) identified by MEPA meaning no other development can take place in the designated area. The site of the two schools was also an ODZ and permission for its development was acquired through parliamentary interventions.

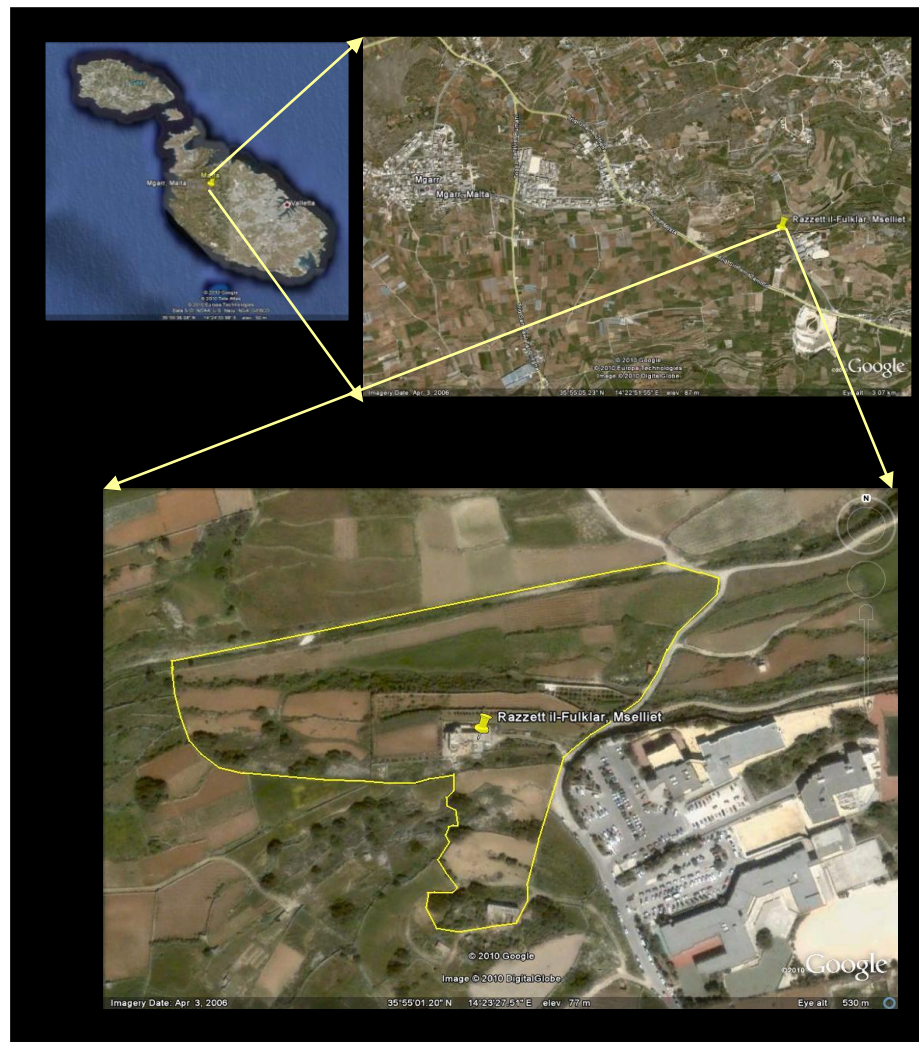


Fig 5.2 Showing the *Razzett il-Fuklar*, a permaculture farm, at Mselliet limits of Mġarr (Latitude 35°55'1.20"N, Longitude 14°23'27.51"E). The yellow line denotes the perimeter of the farm. Adjacent to the farm there are two private schools, San Andrea and San Anton (Source: Google Earth)

Mr and Mrs Mallia followed Holmgren and Mollison concepts and tried to design a good permaculture farm by going through a process, as indicated below:

5.4.1 Designing a selection of **options** is very important to make things happen; however this is a continuous process and is not an end in itself (Law, 2005). Choosing one design does not automatically wipe off all other ones but options open up or close down depending on the output reached. The farm under study is planned following EU regulations and is aimed at being self sustainable and promoting healthier living. Mr and Mrs Mallia also want to share their gained knowledge and experience by posting various reports on the MOAM website, catering for educational visits as well as for eco-tourism and agritourism, where visitors can see and help in the running of the farm, learn about permaculture and the benefits of living sustainably, walk or go horse riding around the farm or further down the valley, taste organic, healthy, tasty traditional cuisine and buy local produce.

5.4.2 Analyse the farm through self-regulation where components balance out (Yeomans, 1973). Mr Mallia identified several components that had to be modified, including: the maintenance of dry rubble walls; the introduction of more local Terra Rossa soil from nearby fields as his land had been degraded over time; the identification of suitable Maltese crops, trees and animal varieties; the study of the microclimate; improvement to water catchment systems; sustainable changes to the farmhouse; the introduction of composting waste facilities; the construction of animal sheds and making footpaths more accessible. These components have to be identified and linked. A simple example found at Mselliet farm is having trained chicken foraging in a stretch of field, eating away pests and weeds, aerating the soil, adding liquid manure as fertilizer, whilst taking care of themselves. They are trained to stay in the designated area and find their way back to chicken coups at night.

These essential components, once placed carefully and in relation to each other, will minimise maintenance work, reduce the need for energy, and result in a modest surplus on sales. Such surplus results from the conversion of 'wastes' into products by appropriate use (Bell, 2004). Many different designs were developed and analysed to see which ones work best. One drawback is that there is a time gap between the start of this project and the actual phase it starts rendering outputs. This is a very delicate stage where the farmer has to know exactly what precautions to take and be patient and persistent. It is this stage that could put some people off from converting to this type of farming, and if designs had to be implemented on a national level, EU subsidies or government help would, undoubtedly, be crucial.

5.4.3 Field observation is of utmost importance to consider all the relevant components and events to devise a 'least change' approach to save energy and time (Fukuoka, 1978). Most important aspects of this farm are the terraced fields, finding sustainable water solutions, and protecting crops and animals from strong north winds.

5.4.4 Deducting from nature or getting into a natural synchronisation with nature as discussed by Masanobu Fukuoka (1978) is also essential to understand local processes and mimic them.

- v. **Structure:** In designing the plot of land, Mallia integrated endemic flora and fauna, and tested new species. A case in point are olive trees, where he added new varieties to the ones already on the farm to enhance pollination and protect from pests and diseases. The two systems used are Alley Cropping and Contour Buffering, as explained in Chapter 3, Table 3.1.
- vi. **Process** of understanding and imitating the flow of energy and the natural processes of the area. This was achieved by understanding how trees propagate and planting them in the appropriate site to maximise this regeneration rate, such as planting pollinating trees North facing so pollination would be equally distributed amongst all the other trees by the frequent blowing northern winds. Understand which trees attract most native birds and invest in them to increase the flora of the area. In fact, olive, pomegranate, carob and other indigenous trees were chosen over palms and other tropical trees. Numerous scattered natural habitats were created to attract natural pest controllers, such as frogs, lizards and pollinators. Numerous patches of garrigue, uncultivated areas and natural waterway are conserved and protected. An attempt is also being made at designing by analogy, a system where sheep, once introduced, will be left in one area, allow for overgrazing and extermination of weeds, remove the sheep and plant the land.
- vii. Using **landscape** characteristics to increase the natural diversity and richness where, for example, the farmhouse, being centrally located, will be used for food and produce storage, food dehydration, to capture wind and solar energy, produce compost by-product and cater for lectures and ecotourism.
- viii. All this entails embracing a **philosophy**, be in search of an understanding of nature and to be content with the search itself, and pass this to others through opening the farm to educational, cultural and tourist visits.

5.4.5 Another important part of designing a permaculture farm design is to **overlay data**. A good site map makes any landscape design much easier and more visual by indicating a lot of sensible options and hypothesis (dam sites, soil/crop suitability). However, they do not take into consideration some factors that cannot be mapped including ethical, financial, and cultural constraints. The following is a sketch showing a cross-section of *Razzett il-Fuklar* (Fig 5.3), followed by MEPA aerial photography of the area in 1967, 1988, 1994, 2008. These images show how the area evolved through times. The farm under study has managed to introduce more tree varieties in the area together with protecting natural garrigue stretches. On the other hand, the development of the neighbouring school engulfed the area. Today, Mr Mallia is struggling to get permits to develop an underground olive pressing and wine storage, amongst others, while only metres away from his farm permits were issued for massive and fundamental land use changes.

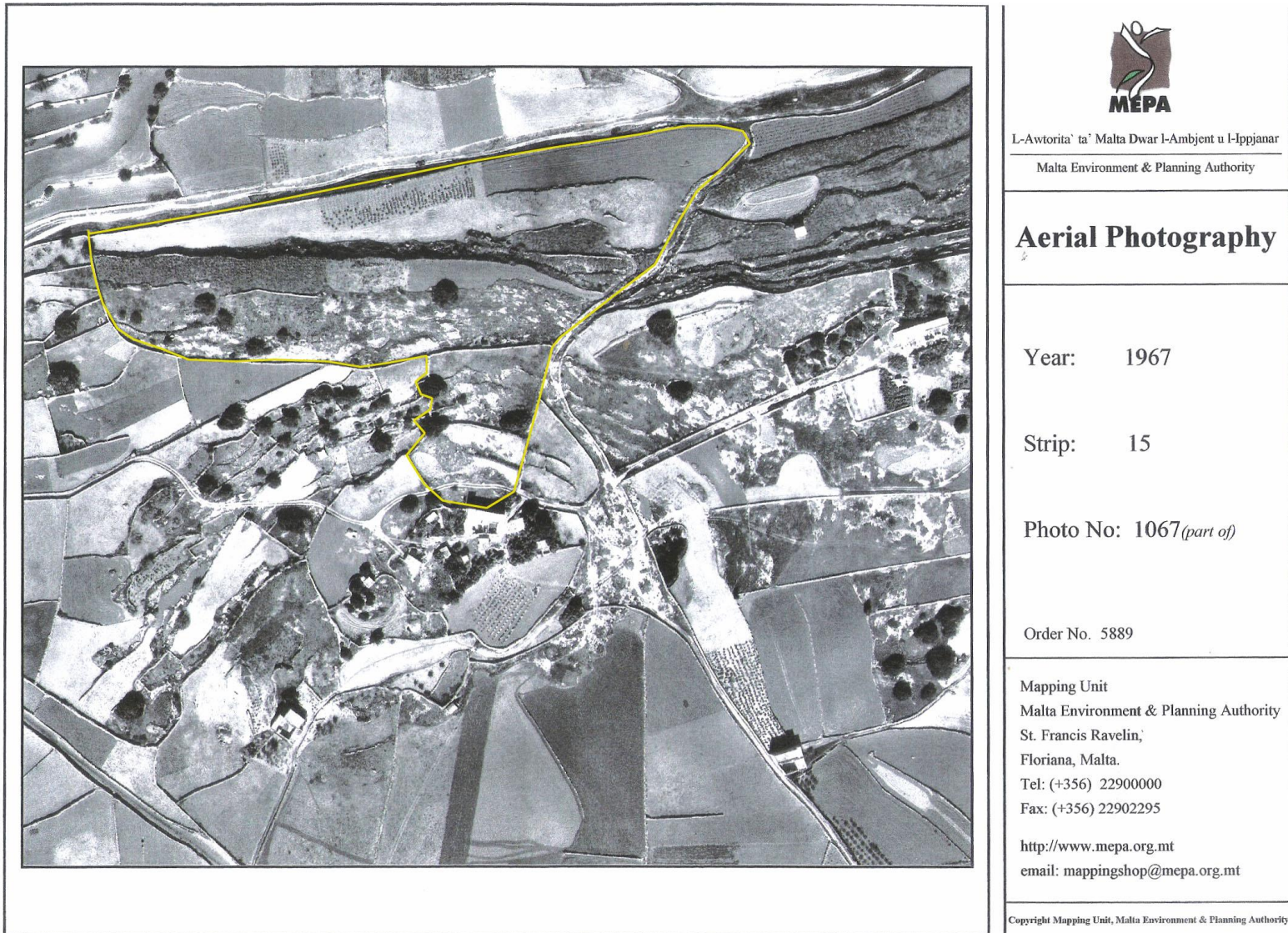


Fig. 5.3 1967 photo of area showing Mselliet area with *Razzett il-Fulklar* delineated by the yellow boundary line. The whole area includes agricultural land and garrigue.

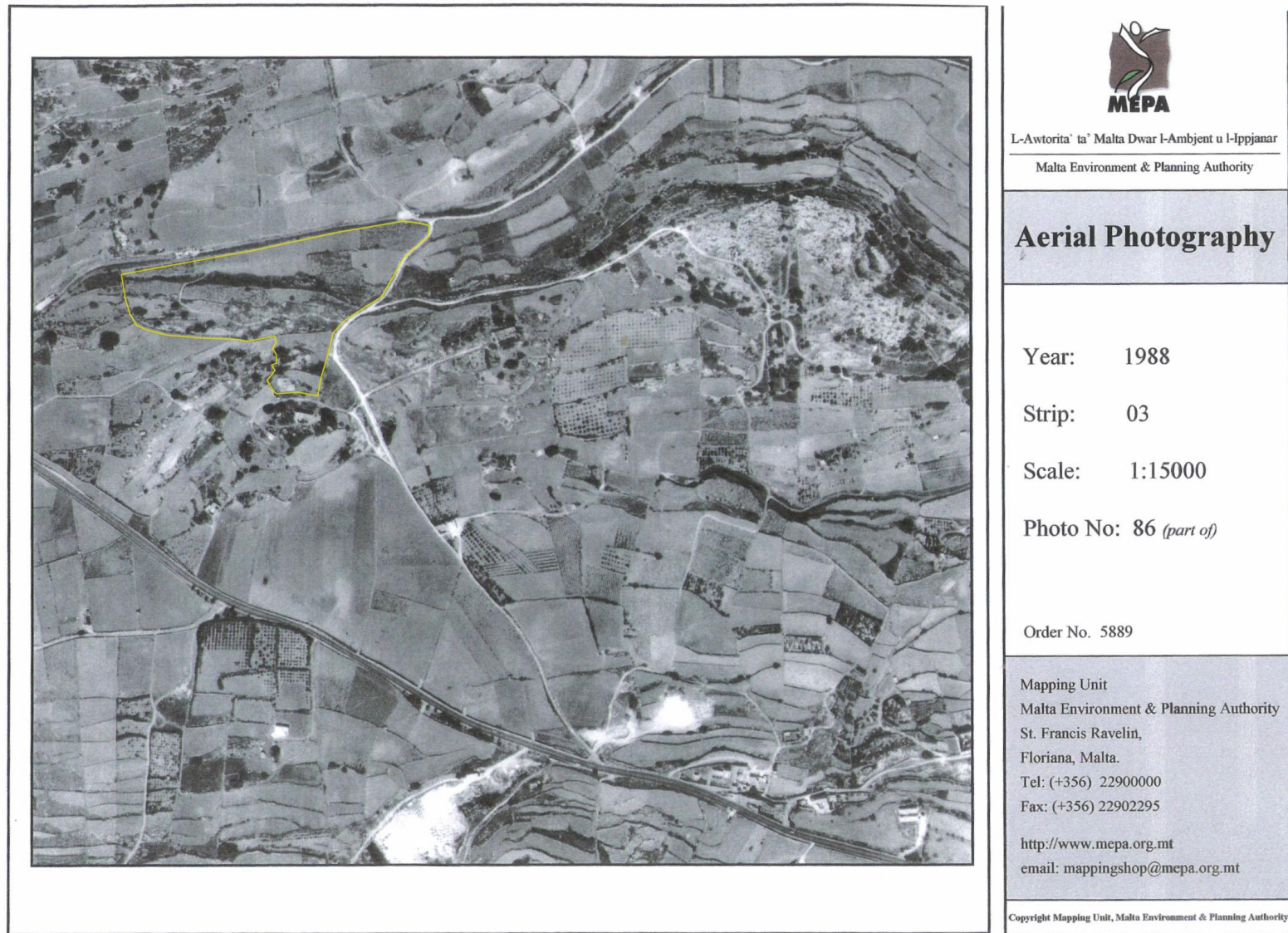


Fig. 5.4 1988 photo showing little development in the area

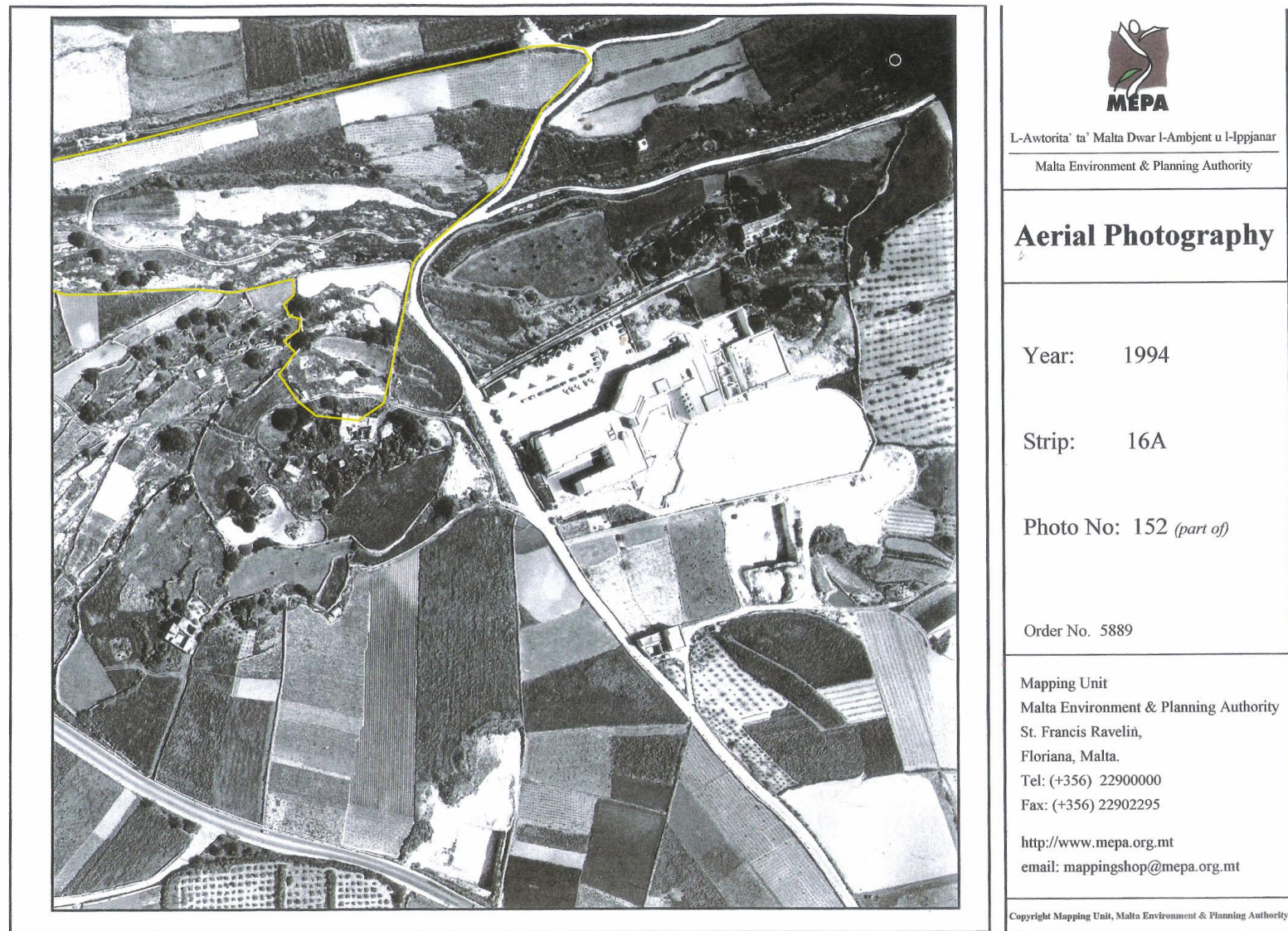
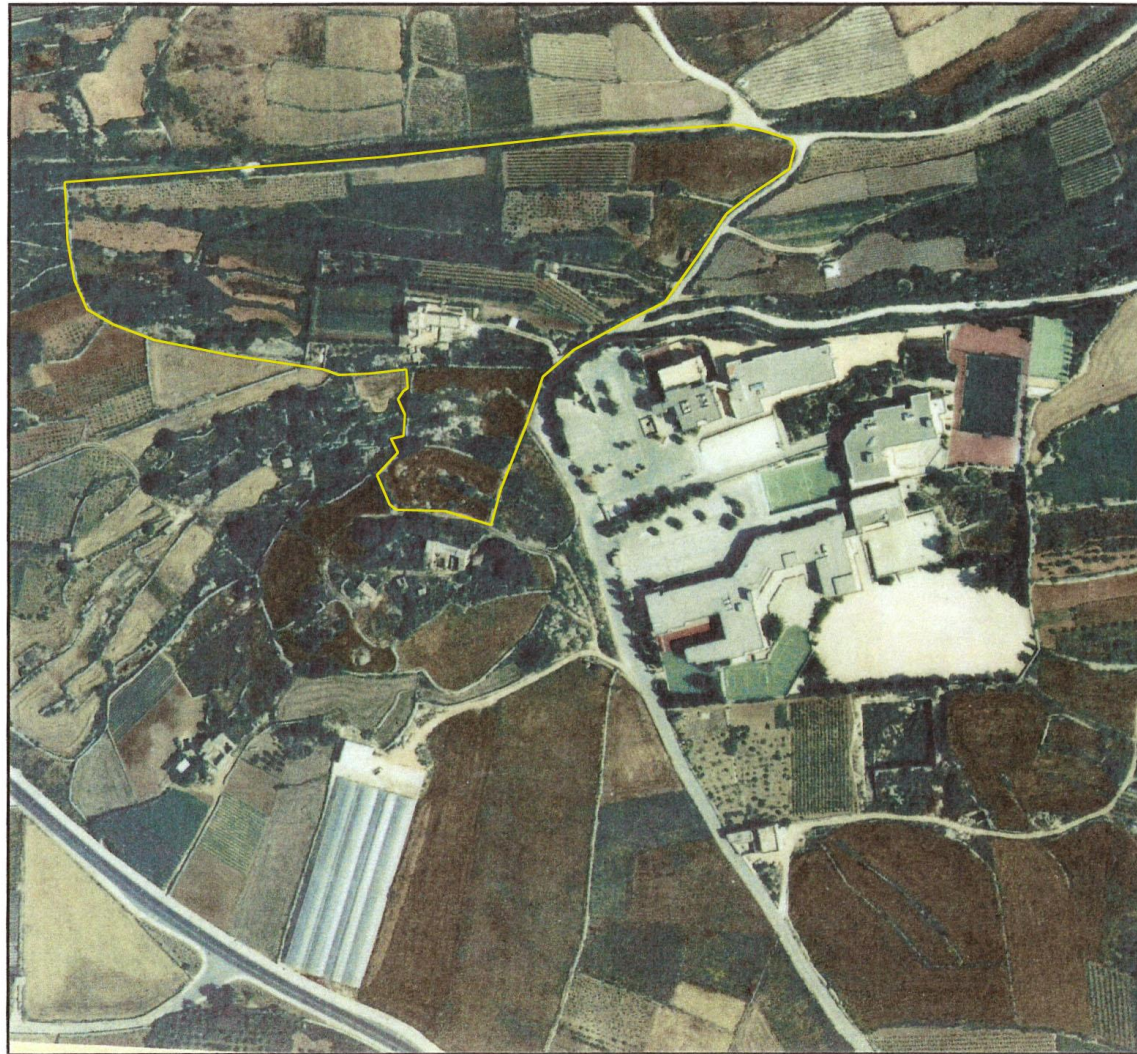


Fig. 5.5 1994 photo of area showing construction works adjacent to farm



L-Awtorita' ta' Malta Dwar l-Ambjent u l-Ippjanar
Malta Environment & Planning Authority

Aerial Photography

Year: 2008

Strip: 05

Photo No: 7880 (*part of*)

Order No. 5889

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Fig. 5.6 Area of Razzett il-Fulklar with developed plant species, trees and intercropping; adjacent large built up area

5.4.6 Once the processes that will be taking place in the farm are understood, a **flow diagram** can be designed to illustrate such processes; then the farm can be structured accordingly. Normally such task is best managed by an experienced worker.

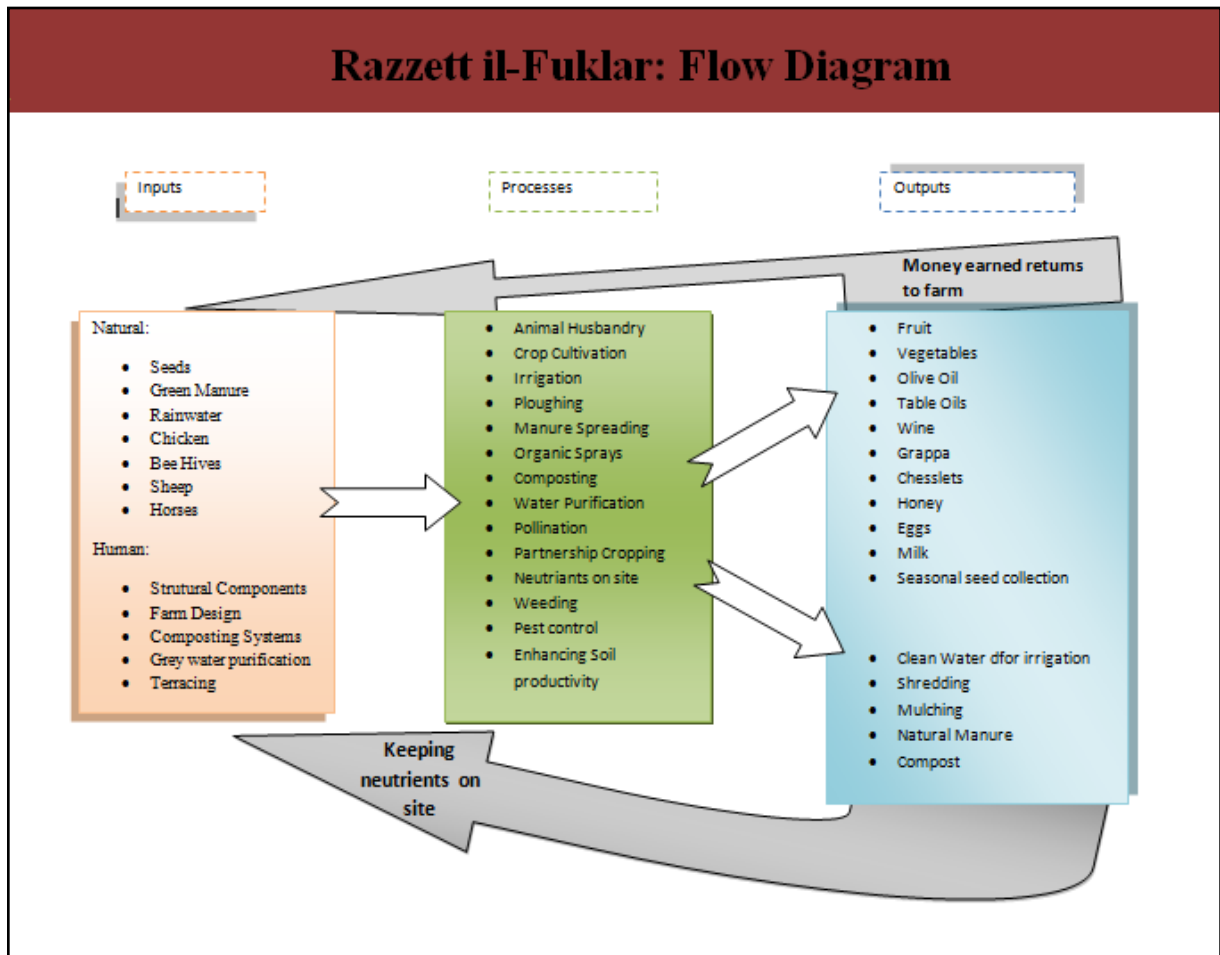


Fig 5.7 Flow diagram showing inputs, processes and outputs which will be implemented by Mr. David Mallia once the permaculture farm is fully functional

5.4.7 Identifying Zones at *Razzett il-Fuklar*

Particular attention must be given in locating the needed components in relation to the energy source. These energy sources are divided into two:

- 1) *Energy available on site*: man power, machinery, water and fuels. For all these, zones are established in order to determine their use, access and time available.
- 2) *Energy flowing through site*: wind, water, sunlight and fire, organised in sectors.

Zones are viewed as a series of concentric circles where the inner part is the most frequently visited and vice-versa. Sector analysis is more site specific than zoning because this system outlines the compass direction from where energy and other factors are related, for example sunlight for plant growth and renewable technologies (Mollison, 2002). The main objective in using these sectors is to block or screen out the incoming energy or channel it to specific uses. This analysis guards its components against natural hazards, such as fire, wind and floods, by including roads, fences, stone walls, embankments, dense trees, ponds. It also encourages wildlife to live in these areas by providing forage systems and nest boxes, amongst others. All this is done to manage all incoming energy to the area. Moreover, zones in this sector analysis can be rotated accordingly. This guarantees that all components selected will work to govern sector factors and thus all components are well placed. The two systems are then combined to form a spider web of placements, putting all main systems in the right place in terms of energy analysis. In reality, in an agricultural area aspect, elevation, slope degree and orientation always need to be taken into consideration. This means that the sector analysis concept needs to be adapted as required to make the permaculture design function as naturally as possible. Thus, combining zoning and sector analysis - as described in more detail in Chapter 3 - helps in creating a farm divided into zones, that are site specific, taking into consideration the aspect, elevation, slope degree and orientation and energy flows (Mollison, 2002). The farm under review is divided in several zones (Fig 5.8), each serving a particular function linked to the twelve principles of permaculture. The farm itself is structured along the following lines, as adapted from Mollison's ideas.

Zone 0: Centrally located, farmhouse

According to Mollison, the golden rule for designing permaculture farms is to develop and control the nearest area to the farm first and then expand further. *Razzett il-Fuklar* was designed along this concept, with the farmhouse built on a high altitude spot in the centre of the farm plot.(Plate 5.1) This farmhouse is built with traditional methods and local stones to insulate it from the summer's heat and retain mild temperatures during winter. It will soon be equipped with photovoltaic solar panels,

making it self sufficient in energy. Excess energy would then be transferred to the national grid. Three wind turbines are also planned to maximise energy input, especially during winter times when the north winds will be strongest. At the back of the farmhouse, a patch of land 45 metres long is used to grow a variety of herbs and vegetables, for personal consumption using traditional cooking recipes. This area is surrounded by Olive trees (*Olea europaea*) including varieties such as the Carolea, Uovo di Piccione and Pendolino, intercropped with ornamental trees such as Lentisk (*Pistacia lentiscus*), Judas tree (*Cercis siliquastrum*), Pittosporum (*Pittosporum phillyreoides*) and Phoenix Palm Trees (*Phoenix dactylifera*) (Plate 5.3). Domestic animals are kept in this area, with guard dogs in kennels and pet dogs in farmhouse, a horse used for riding (Plate 5.4) and chicken coops where free range chicken are trained to sleep. There is a lecture room to cater for educational visits and eco-tourism. A manure pit is located in the west part of this area where the north winds blow any smells away from the farmhouse although is close enough to the road to enable the transport of the fertiliser to lower altitude fields. There are also plans to make use of existing basement for residential/storage purposes⁶ and to construct an adjoining building to the existing farmhouse in order to facilitate small-scale wine-making and olive pressing. These will keep energy in the farm, without the need to transport the crops and will guarantee fully organic end product since, as stated by Mr. Mallia, there is only one pressing machine in the Maltese islands that is organic and it is found in Gozo.



Plate 5.1 Razzett il-Fuklar surrounded by fields and trees, with the display of MEPA permit (PA/00765/07) (Source: D. Mallia)

⁶ MEPA permit PA/04529/01



Plate 5.2 View from roof overlooking a West facing vegetable patch used to grow herbs and vegetables (Source: S.Vella)



Plate 5.3 Organic pumpkins stored on roof of farmhouse, to avoid from rotting in humid areas (Source: S. Vella)



Plate 5.4 Horse used for riding (Source: S. Vella)

Zone 1: High Altitude Low Maintenance

At an elevation between 103.51 metres to 93.42 metres, the terraced fields at *Razzett il-Fuklar* are planted with trees and shrubs to act as windbreakers and prevent soil erosion by water run-off (Plate 5.5). Rain-fed, mature wild almonds, carob, and cactus are found here. This allotment is also used as rainwater catchment area with a series of channels that divert water to underground reservoirs. Water is conserved in key points for later usage in fields for crop irrigation and house needs.



Plate 5.5 Carob trees and garrigue land (Source: S. Vella)

Zone 2: Shelter belts/wind breakers

Shielding the farm and the garden vegetables from the cold, strong north winds is a narrow stretch of land (150 m by 10 m) planted with stone fruit trees, olive trees, citrus trees, kaki⁷ trees, pomegranate and bay leaves (Plate 5.6, 5.7, 5.8). This is also a free range area for chickens, which help in reducing pests and adding manure. Trees, together with rubble walls and fences, act as slope stabilisers.

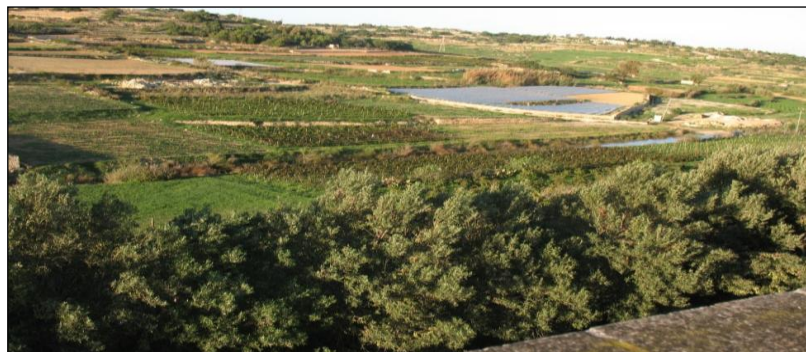


Plate 5.6 View from roof: windbreakers and terraced field underneath (Source: S. Vella)

⁷ Kaki Tree (*Diospyros kaki*)



Plate 5.7 Olive Tree (Source: S. Vella)



Plate 5.8 Pomegranate Tree (Source: S. Vella)

Zone 3: Preserving natural ecosystem: garrigue area

The cliff face zone 3, is found along the sloping area beneath Zone 2. This is left under natural conditions with wild thyme, rosemary, carob trees and old olives (Plate 5.9).

There are plans for improving accessibility to the road and using the secluded part under the trees of Zone 2 to build horse stables and a sheep pen and to install a cesspit and grey water purification⁸ system (Plate 5.10). This area is also to be used for composting (Plate 5.11) and vermicomposting⁹.



Plate 5.9 Cliff face under natural garrigue plants (Source: S. Vella)

⁸ Grey Water Purification: any wash water except that of toilets is purified to be used again especially in agriculture

⁹ Vermicomposting: Earthworms turn organic wastes into very high quality compost



Plate 5.10 Footpath and reeds behind orchard wall. Some reeds will be left to screen the planned sheep pen, horse stable, grey water purification system and cesspit (Source: S. Vella)



Plate 5.11 Intercropping in the background with sweet corn and pumpkin foliage to be used for composting on the foreground. (Source: S. Vella)

Zone 4: Horticulture and Apiculture¹⁰

The lower part of the farm is located on a gentle slope (76.52 m - 80 m), has good road access and is terraced with well maintained rubble walls. It has also water stored in a pond and is bordered by the natural spring. This area is used for growing tomatoes, pumpkins, potatoes, onions, peas, beans, carrots, celery, herbs, peppers, aubergines, beetroots, spinach, broad beans, cucumbers, marrows, melons, lettuce, artichokes, turnips, sweet corn, wheat, fodder, banana, fig trees and reeds. In the vineyard there are varieties of Girgentina, Chardonnay, Mourvedre, Grenechace and Gellewza vines. (Plate 5.14) Following the principles of the PRIMO project, part of this land is devoted to growing the indigenous olive tree - the Bidni. Once in place, the greenhouse will face south to receive the maximum sunshine possible and will be screened from the north winds by olive trees. The greenhouse will, in turn, shade the area left for apiculture (Plate 5.12, 5.13). These bees will be used to pollinate plants in the greenhouse. This area is also very prone to wind and water erosion although this is very well controlled by good farming practices which include contour ploughing, use of adequate machinery, well maintained rubble walls and a small olive grove stabilizing the soil with an intensive root system (Plate 5.15).

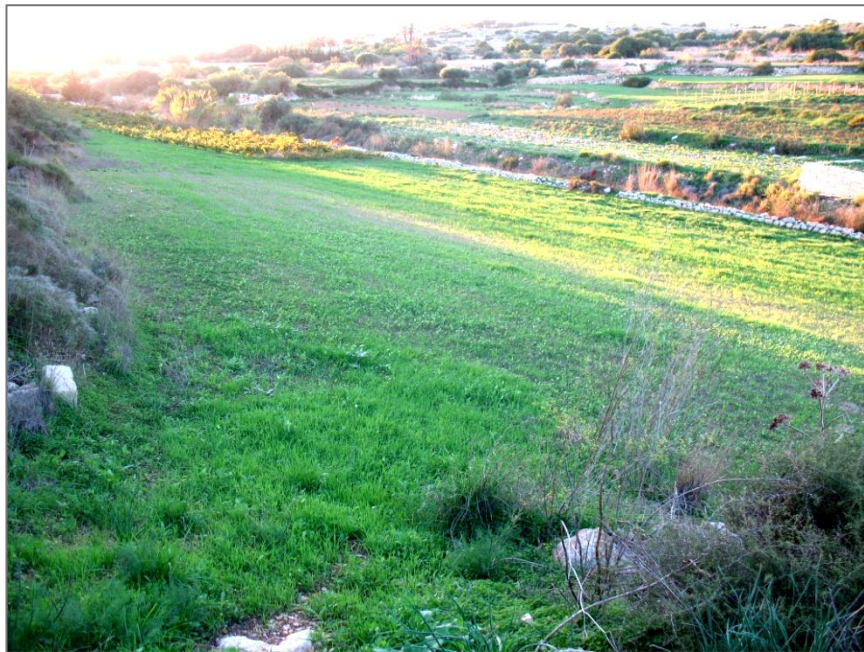


Plate 5.12 Area to be developed into a crop rotation field, with a row of apiaries screened by a greenhouse. (Source: S. Vella)

¹⁰ Apiculuture: Bee keeping and honey making



Plate 5.13 *Razzett il-Fuklar* behind wind breakers, with a garrigue cliff face atop the crop field
(Source: S. Vella)



Plate 5.14 Vineyard with drip irrigation
(Source: S. Vella)



Plate 5.15 Intercropping: potatoes, olive trees and carobs (Source: S. Vella)

Zone 5: Natural freshwater ecosystem

The Mselliet Valley provides a source of freshwater, and thus an ecosystem for insects, amphibians and typical freshwater vegetation such as pennyroyal (Plate 5.16).



Plate 5.16 Stream in Mselliet Valley (Source: S. Vella)

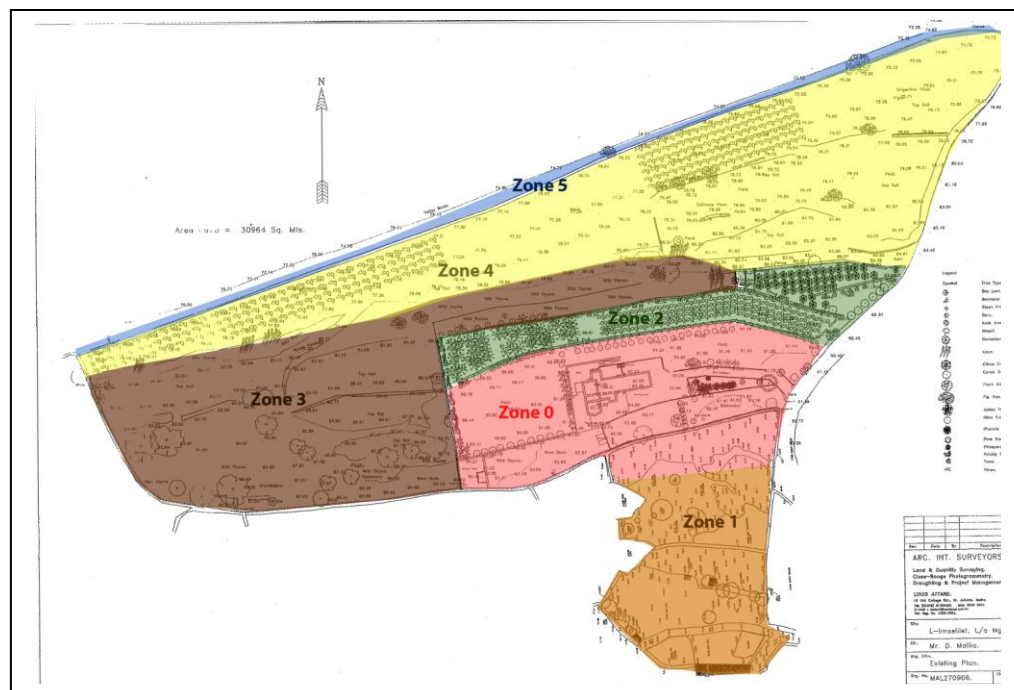


Fig 5.8 Aerial Sketch showing zones (Source: S.Vella, Attard L)

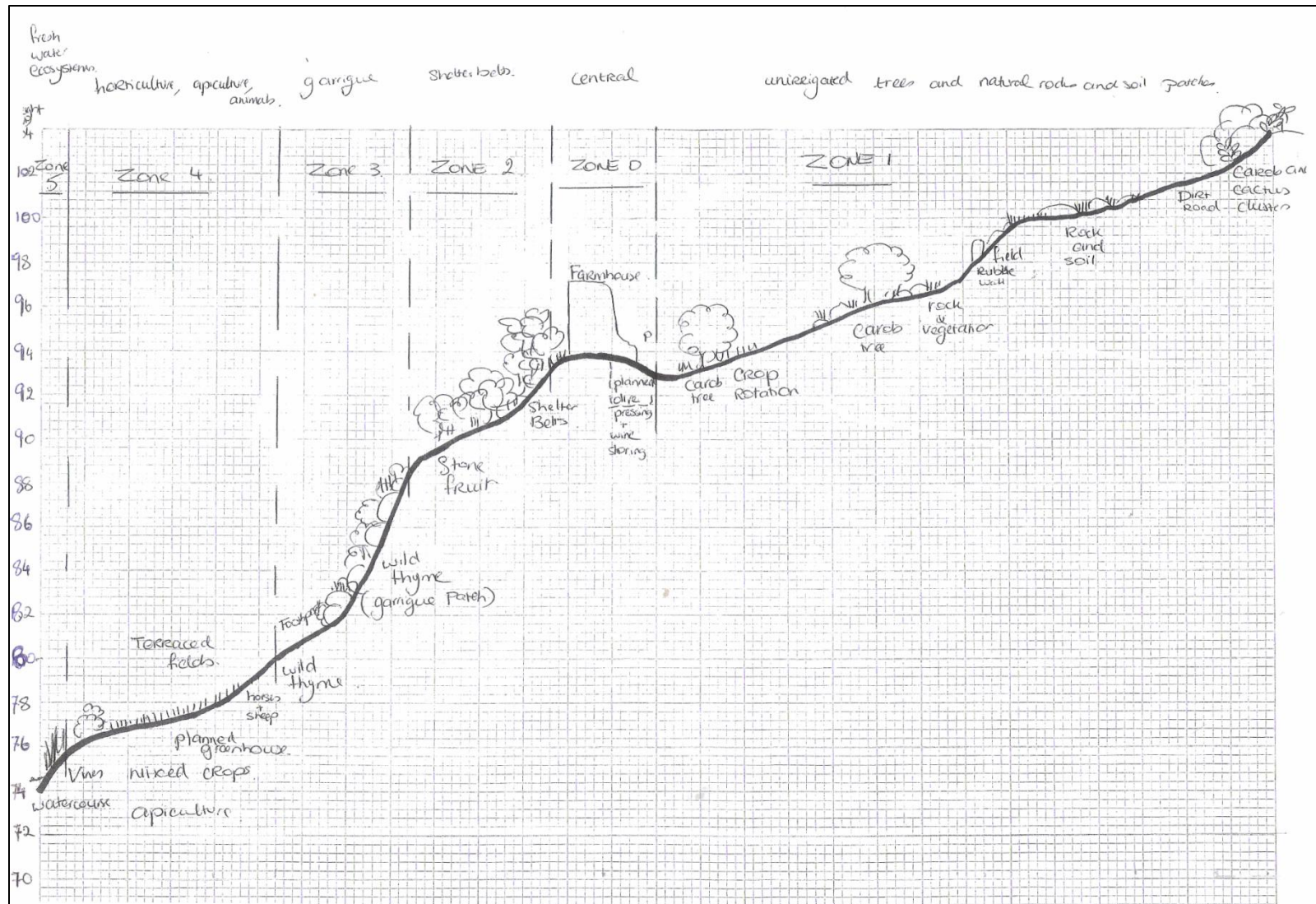


Fig 5.9 Razzett il-Fulklar Cross section along the widest part (Source: S.Vella)

5.4.7 Application of Mollison's Permaculture Principles at Mselliet farm benefits of placements and recommendations

Table 5.1: Permaculture Principles used at Mselliet Farm

Permaculture principles	<i>Razzett il-Fuklar</i> on-site components
1. Observe and interact	Seasonal planting of crops and trees, experimenting with varieties year after year so as to learn about the behaviour of the plants, rearing of chicken for weed and pest control and observing their interaction so as to be able to understand links between these components. Will soon be introducing geese and sheep to help in completing the nutrient cycle.
2. Catch and store energy	4 solar panels (South facing and rotating accordingly) next to the drive-in 3 wind turbines (facing North West) adjacent to west boundary - A complete nutrient capture and cycling by shredding, composting, and composting toilets.
3. Obtain a yield	- Vineyard (wine making and grappa), olive trees (olive oil production), herbs, seasonal crops including pomegranates, figs, various vegetables, citrus trees, kaki, bay leaf, stone fruit, prickly pears and honey - Educational visits, agritourism, ecotourism. - Own packaging systems. - Horse riding and biking. - Organic lunches.
4. Apply self-regulation and accept feedback	Elements in farm are not balancing out yet as a number of MEPA permits are still pending. These include composting toilets, vermicomposting, grey water purification systems and septic tanks, the introduction of local bees as pollinators and honey producers, the introduction of grazing sheep and olive pressing on site.
5. Use and value renewable resources and services	- Wind and solar energy. - Soil, water catchment areas and natural vegetation that provide input to the farm. - Chicken, geese and sheep for weed and pest control.
6. Produce no waste	Composting toilets, vermin composting, grey water purification systems, cess pits and water filtration systems.
7. Design from patterns to details	- Farmhouse is south facing full of energy efficient components such as double glazing, solar water heating, use of local building materials to control humidity in house and collection of rainwater. - All fields lead to the focal point by small roads and pathways. - Olive trees to screen buildings like greenhouses and farmhouse.
8. Integrate rather than segregate	At present, chickens are kept in the chicken coup and allowed to forage in a restricted area. However, the aim is to allow chickens to range freely in Zone 2 where trees act as windbreakers, and train them find their way to the coup at dusk.

9. Use small and slow solutions	- Looking for quality products only and using natural manure. The latter requires time for the manure to dry and ferment and is then mixed with the soil. Although this is definitely not as fast as mechanically hoeing the soil and adding a synthetic fertiliser, this will make soil healthier and plants stronger. - Using pheromone traps and smelly fish concentrates in pierced recycled plastic bottles to attract and trap insects such as the olive fly. This is not invasive and keeps the tree healthy. - Leave land fallow to regenerate its lost nutrients for up to 3 years. This means not harvesting crops for a long time, but ensures the regeneration of soil fertility together with the return of soil creatures that are indispensable for soil aeration and circulation of nutrients.
10. Use and value diversity	- Polyculture methods used to enhance soil richness and guarantee a variety of crops all year round. - Crop rotation, partnership cropping, polyculture, intercropping, companion cropping and relay cropping.
11. Use edges and value the marginal	- Preserving the garrigue areas for bees and honey making, investing in rubble walls and fences to protect fruit trees from winds. - Protect the stream and its ecosystem.
12. Creatively respond to change	The biggest challenge present to date at <i>Razzett il-Fuklar</i> is the lengthy bureaucratic times that are keeping some important developments on hold. In the meantime, however, the needed structural changes were done, including insulating the farmhouse and maintaining existing rubble walls.

Table 5.2 Benefits of placements in farm and further recommendations

Placement	Benefits	Recommendations
Chicken coup	Close to the house for ease in all seasons but not too close so as to avoid smells and noise. Also near to the chicken's pasture land and the vegetable plot so that they can do vegetable gardening pest control from time to time and eat up vegetable garden scraps.	Install gates for chicken to control forage. Chicken coup should be raised so that area underneath coup provides shelter during rain or hot sun. Some chickens should be left to range near compost bins so kitchen scraps can be split between chicken food and composting.
Pasture	Next to the chickens, sheep sheds and horse stables.	
Shed	Fairly close to the house for storage, sheep's quarters located furthest away from the house to avoid smells and noise. It also insulates and shelters the hen house.	
Cottage industry	Designed within the farmhouse (still awaiting permits).	

Fences and rubble walls	These are all placed to provide protection, habitat, and a shelter belt.	
Drip irrigation system	Watered by drip irrigation on a timer so the distance is not as important as when the old channel system for irrigation was in use.	Better water catchment system and functioning channels to use slope angle for water to move down all slope sides. This would avoid using fossil fuels to power the water pump.
Wood fireplace		Pruned branches and trunks cut into pieces and used in fireplace. It provides winter heat and cheer.
Veranda	The veranda is on the North facing side of the house, partly shaded by large trees in summer. It is accessed via the front door and also through indoors directly from the kitchen.	
Pond	Rainwater collected here to be used for irrigation purposes.	
Septic tank	Does not require any day-to-day maintenance (although still awaiting permits). Grey water purification systems would be used to, as much as possible, re-use this water for irrigation. Will be emptied once a year by bulldozer, if necessary.	
Solar water heater	Positioned for maximum solar gain (South facing); it requires only very occasional and minimal maintenance. It either heats or pre-heats the water on sunny days. This is circulated using a pump driven by a solar photovoltaic system.	
Sheep and horses	Stables are hidden and close to footpath. Water used for washing animals collected in septic tanks (still awaiting permits).	Few animals and more varieties.
Vegetable plot	Irrigation from underground reservoir and borehole.	
Herbs	Located closest to the farm in the front part, accessed from the back door or through the veranda. In this case this is more convenient than constructing a herb spiral.	
Manure	Collected from farm animals and stored nearby for future use in fields. Sometimes manure is bought from nearby animal farms too (for example cow manure).	
Vine plantation and Olive grove	Furthest away from the house and does not require any attention - just ploughing and pruning.	Need farm diversification, the better use of land and adoption of intercropping techniques.

Reservoir	Situated in the basement where water is pumped for irrigation purposes.	Water from road diverted to reservoir.
Shredding	Pruned vines, tree branches and crop foliage shredded and scattered on all fields.	
Cooking		Introduce wood fired oven outside farmhouse. Experiment with a solar cooker when possible.
Olive pressing		If situated on farm, could minimize transport costs, keep energy on site, produce organic oil, and use olive mash residue into biomass or natural fertiliser.
Pathways	Give good access to all farm areas.	These should be more organized and well kept to allow eco-tourists and visitors easy access on plot without the risk of trampling on soil and harming plants, and avoid injury to persons.
Raising awareness		Introduce signs to reach farm easily, for better access and sale of produce. Label crop and tree varieties. Apply for EU certification.

5.4.8 Problems encountered during farm planning:

- *MEPA permits:* The biggest problem encountered in this project is getting all the necessary permits to proceed with the structural work. Getting MEPA permits is a long and costly process. The main issue is that the farm is in an Outside Development Zone (ODZ), even though most of the permits include concealed structural works (Appendix 1). A permaculture farm cannot really operate if the components are not in place.
- *Conflicts of interest:* MEPA gave permission for the development of two prominent schools adjacent to *Razzett il-Fuklar*, also in an ODZ. This was granted through a parliamentary decision (Bencini, 1995). Both schools are 2-3 storeys high, and built exactly on valley side. They are not concealed by trees and are an eyesore.
- *Some EU regulations do not follow natural time frames:* Mr. Mallia applied for EU funds to grow Mourvedre and Grenechare vines instead of Girgentina. The latter was already in place and yielded better profit. To make this change requires leaving the land fallow for about 3 to 5 years so that the soil regenerates and provides a good harvest. However, due to set EU

timeframes, the MRRA asked Mr. Mallia to plant vines after the land had been left unused for only one year. This puts strain on land, adds the risk of soil erosion and could result in the need for extra fertilizer.

All this highlights a serious problem, namely that most of the issues encountered to date come from law making bodies. Mr. Mallia is a knowledgeable person, who believes in permaculture and seems to have the right potential to make his farm work if given the necessary permits.

5.4.9. Concluding remarks

Understanding the implications of managing and maintaining such a farm could serve as a showcase to promote this holistic management perspective to local authorities. Up to date, most literature states that permaculture farms can function very well on small scale plots, with dedicated farmers, and are ideal for Mediterranean regions (Edge, 2009). We could thus tap this potential, produce more healthy food, conserve the local natural environment, reduce the use of chemicals in agriculture, encourage farmers to stay in business and increase green-tourism

Chapter 6: Results, Analysis and Discussion

6.1 General picture

As discussed in the Methodology Chapter 4, thirty-three interviews were carried out in order to gain knowledge about the farming situation in the Maltese islands, with special reference towards sustainability and the possibility of adopting relevant permaculture techniques to cater for its future demands. Interviews were divided as follows:

- *twenty six famers* were chosen through purposive sampling techniques, from which twenty three are full time conventional farmers, two part-time farmers and one organic farmer;
- *five departmental personnel* interviews who are employed at the MRRA; and
- *two foreign experts*, with one being involved in the International Federation of Organic Agriculture Movement (IFOAM) and was present in Malta during the Eco-Gozo¹¹ launch in March 2010, and the other is involved in the BIOLMED steering committee and visits Malta regularly for meetings, on-site visits of organic olive groves and related matters.

Other Maltese agriculture organizations were also contacted, albeit unsuccessfully, mainly due to summer meetings abroad or, in one particular case, the organisation ceased to operate. Interviews to farmers and departmental personnel were carried out in Maltese, and the transcripts translated to English. Interviews with the Italian expert were carried out in Italian, and then translated in English, whilst the Greek interviewee answered directly in English. (see transcripts of interviews in Appendix 2).

The semi-structured interviews with farmers were carried out in an informal way to understand their perception of the farming situation in the Maltese Islands, including past practices, the transition to modern farming practices and their view of this industry in Malta. Their feedback on local and international governing bodies was also sought. The interviews to departmental personnel focused on the regulations on farming in Malta and the proposed measures that government is taking to encourage farming sustainability in Malta. Interviews with foreign experts were carried out to understand their concept of sustainability and their view on how this is being carried out in Malta. The diverse backgrounds of these interviews helped in obtaining a wide perspective of the agricultural situation in

¹¹ EcoGozo is a concept which summarises Government's aims at transforming Gozo and the Gozitan society into an environmentally, socially and economically sustainable reality

Malta, leading to a comprehensive qualitative analysis, which helps one understand the future of farming in Malta, the importance of sustainability and where permaculture techniques could be a solution.

6.2 General picture

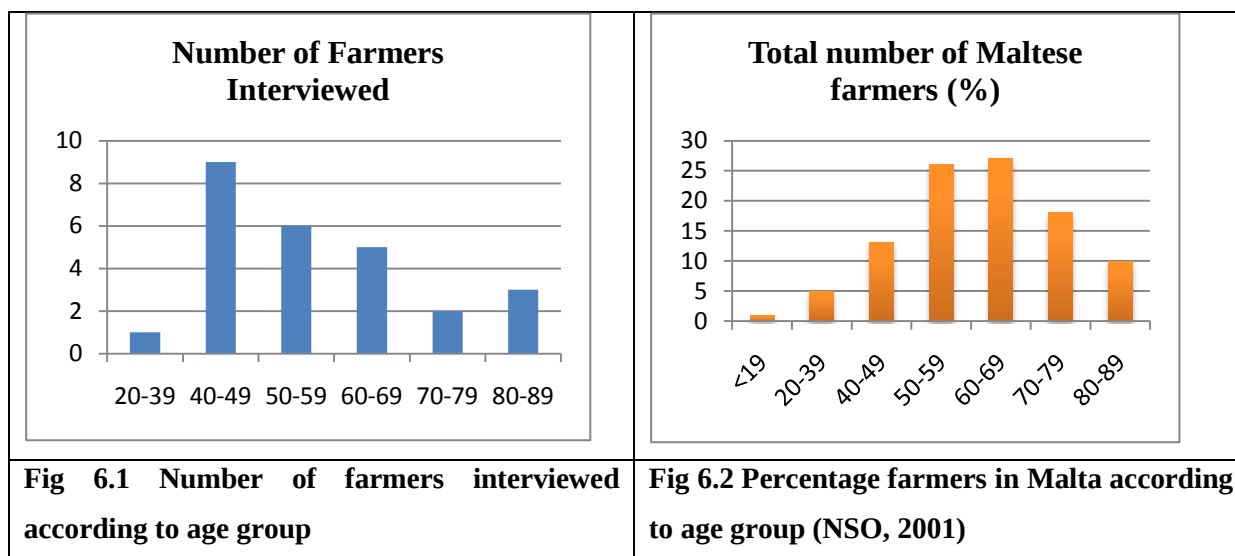
Farmers in Malta are few, mostly middle or old aged, who use considerable amounts of chemicals on their farms, which are worked intensively. Many practice monoculture. There is a general awareness of what organic is but many do not follow this method because of strong market competition. Most farmers are not aware of what the CAP is nor of its aims. Most farmers are worried about their future, are spending considerable amounts on chemicals, feel that *Pitkala* does not make them justice and are not satisfied by the performance of concerned authorities. Maltese regulations follow EU directives and focus mainly on sustainable environment and the protection of the countryside and valleys; however, permaculture is not mentioned anywhere and farmers feel there is not enough enforcement. Farmers who know what permaculture implies believe that it is the way forward, where farmers focus on the design of the farm to follow nature's rhythms and respect the environment. The departmental interviewees are also worried about the future of farming in Malta and that the Single Market is proving a great drawback for the small-scale farming such as is practiced in this country. They are in favour of any initiative that promotes Maltese products and protects the environment. Foreign experts believe that Malta has a big potential and should invest in more EU projects to promote organic farming and tap new markets focusing on quality, organic products.

6.3 Farmers' interview results

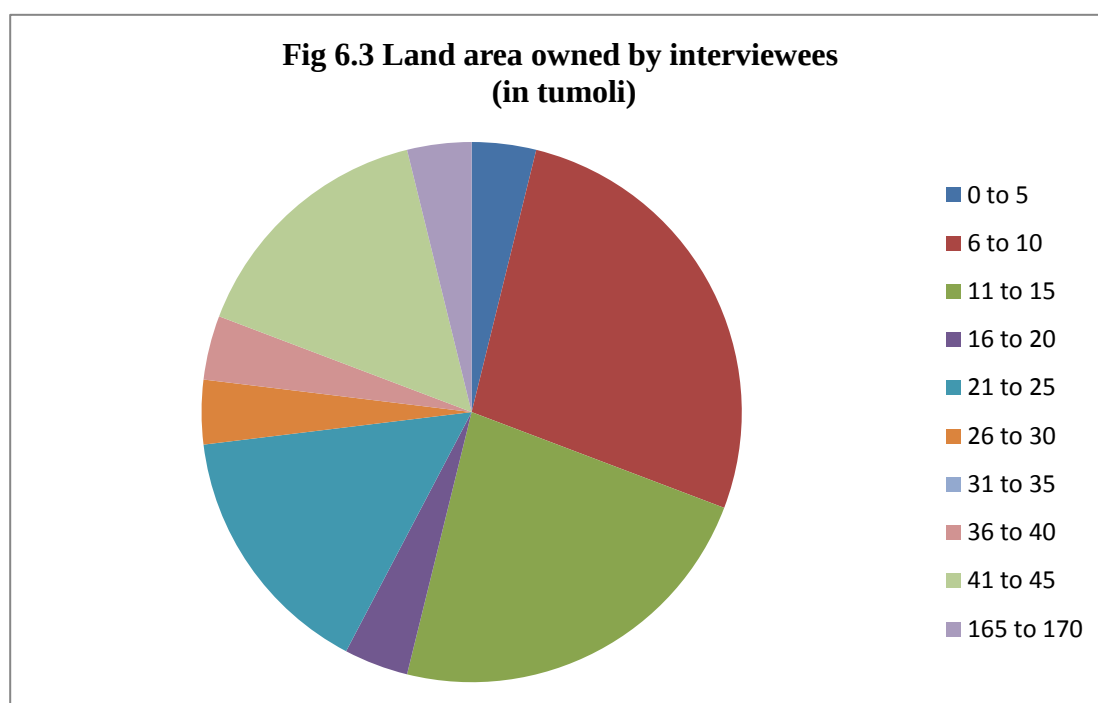
6.3.1 Demographics

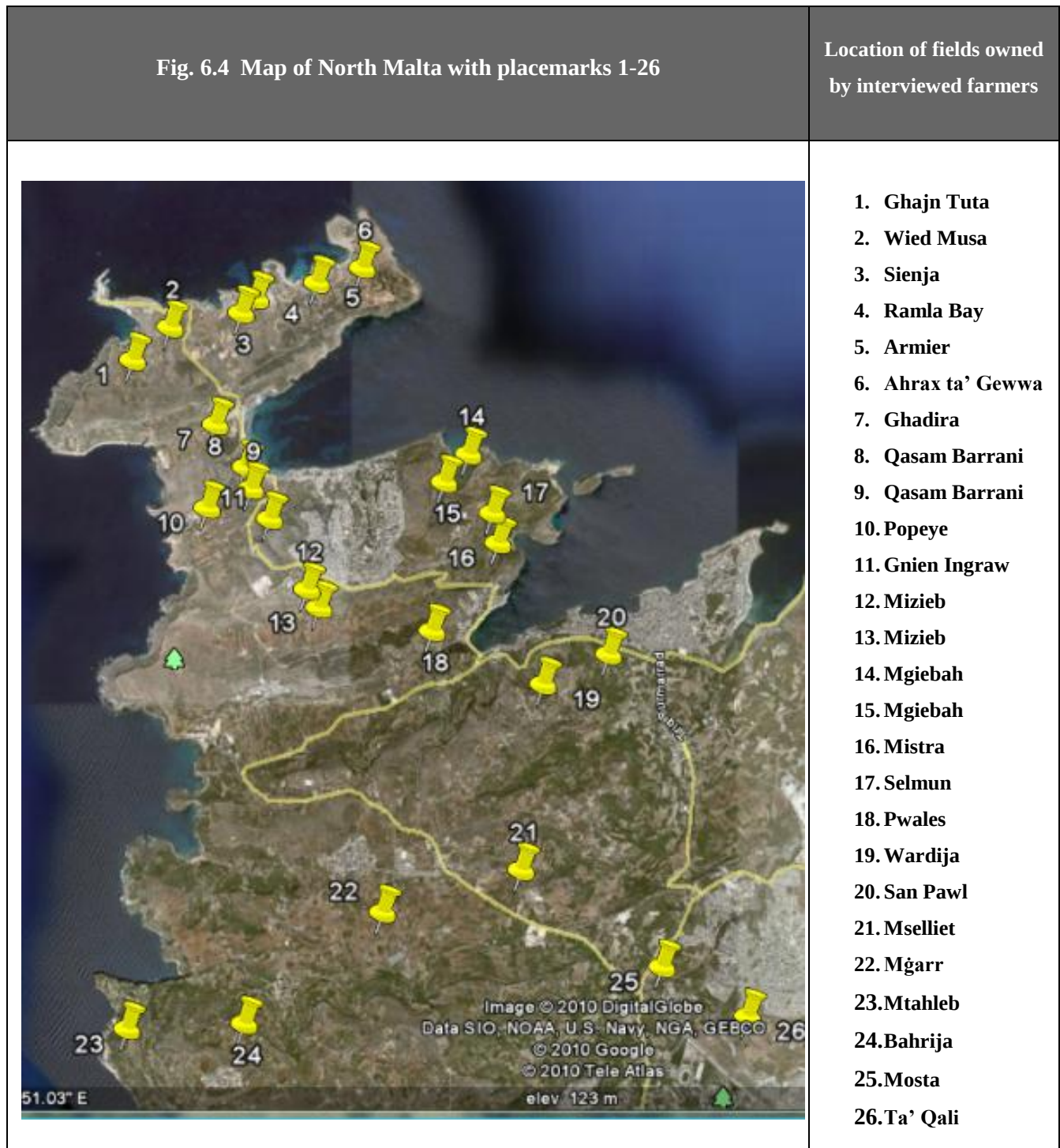
23 male and 3 women farmers were interviewed. This was done intentionally to keep in line with the 2001 census gender ratio of 7:1, where total male full-time and part-time farmers in the Maltese Islands amount to 13,994 and females to 1,951 (2001 census) (Fig. 6.2).

Most farmers interviewed were between 40-49 years, followed by the 50-59 age group (Fig. 6.1). It is interesting to note that some farmers from the 60-69 years age group were contacted but were sceptic and not interested in being interviewed. Younger farmers proved to be more willing to participate. On the other hand, the oldest group of farmers (70 years or older) enjoyed reminiscing about old times and showed real concern about what the future of the local farming industry might be.



Most farmers interviewed were owners of between 6 to 15 tumoli (where 1 tumolo = $1124 \text{ m}^2 = 0.112 \text{ ha}$) (Fig. 6.3). Total area under study amounted to 672 tumoli or 75 hectares (out of a total of 2,722 hectares of Northern agricultural land declared by farmers, NSO 2003). The fields under study are marked on Fig 6.4.





(Source: Google Earth)

Soil types of these fields included all three types, namely Terra Rossa, Xerorendzina and Carbonate Raw (see Chapter 3), with Terra Rossa being the most common.

Ten interviewees have been farming their land for an average of 21 years while the rest have farmed the land since childhood. Of these, only six farmers tested their soil at *Għammieri* soil laboratories, with three of them acquiring satisfactory results, and used these tests to *“be able to give ... plants and crops what they need ... to better understand energy inputs and outputs ... and be as efficient as possible.”* (Mallia, 2010). Most of the farmers expressed a general sense of untrustworthiness towards *Għammieri* with comments such as:

“the results never came and when I went to Għammieri they told me that the file does not exist”

(Pawlu, 2010)

“samples are not done properly ... you take your sample to Għammieri and you find out that your soil is similar to soil found in the southern part of Malta ... nonsense ... waste of time and money”

(Martin, 2010)

and “system does not make sense, you take soil at Għammieri fertilization plant, they just classify it, do not inform you well on what you should do to improve soil and how, do not even try and relate it to the characteristics of the area, feedback is very general with no detail at all, just another gimmick”

(Jimmy, 2010)

Eleven of the twenty six farmers interviewed are members of farming co-operatives, mostly the ‘Żebbiegħ Agricultural Cooperative’ and ‘Mgarr Farmers Cooperative’. Advantages for members are buying in bulk and thus reducing farming inputs expenditure. However, non-members feel that being part of a co-operative is a waste of time as co-operatives offer no support to farmers with regard to farm development, issues with authorities and help with EU incentives and acquiring EU funds.

6.3.2 Understanding past practices

Farming in the past required a lot of manual work. Labourers were more and used non-invasive farming methods. A case in point is the *sienja*, where animals including bulls, cows, and donkeys were used to manually pump up water from huge boreholes, which was then stored in reservoirs (see

Appendix 3) Crops were irrigated by an organised system of water drainage. Channels were carved in upper coralline limestone or globigerina limestone, and were used to let the water flow from the main reservoir to the fields in need of irrigation. The fields farthest away were irrigated first as there would be more water pressure in the initial phase of the irrigation. Water was then diverted from these rocky waterways into other forms of channels dug in the soil, known as *is-seqja*. As water moved down these *seqja*¹² it was diverted by a *maksra*¹³ to the patches of soil in need of irrigation known as *hammiela*¹⁴ where this was enclosed by a small embankment known as *gafun*¹⁵. Once this *hammiela* was irrigated, the *maksra* was closed and water moved to the second next *maksra*, and so on. The dry *hammiela* of the same section were irrigated as the farmer moved back up towards the *seqja* (see Appendix 4). This field design was created by farmers where soil was levelled to the required angle and no water was lost in this process, giving an even irrigation to all parts of the field. *Is-seqja* was never planned adjacent to rubble walls so as to eliminate the possibility of water being lost through the rubble walls. Such channels were dug in an opposite direction due to the soil slope angle. Later on this system was replaced by sprinkler and drip irrigation methods, and the *sienja* was replaced by Chicago windmill and later by submersible water pumps.

Not all agricultural land was irrigated from natural springs and reservoirs. Certain fields located in the open countryside were rain feed only. This produced the typical farms of the Maltese Islands which can be divided into irrigated and non-irrigated land, each ideal for particular crops.

Most farmers used local trees such as olives, reeds, figs and pomegranate, black mulberry and carobs as wind breakers, for obtaining a yield, for preserving the soil, and as animal fodder. In the fields between these trees, they used to practice crop rotation and planted crops according to seasons ... *“during the first year we planted potatoes, carrots, cabbages, peas or beans; in the second year we alternated these crops in a clockwise cycle ... this helped stop the build up of pests and diseases found in the soil ... obviously this took a lot of time and patience ... but it was worth every effort ... we used to take good care of the environment because it was our life”* (Ġanni, 2010). Rubble walls were built and well maintained to protect the soils and as part of the terracing systems.

Not all farmers reared animals on their farm, however all obtained or bought local natural manure (from cows, rabbits, horses, chickens and pigs), which they left to dry and spread by hand across the

¹² Seqja - a channel made by farmers in the soil to divert water to the hammiela

¹³ Maksra - an open section of is-seqja which allowed water to enter the hammiela. It is also found in the water channel systems carved in rocks to allow water to be diverted to particular fields for irrigation (see Appendix 4)

¹⁴ Hammiela - a subdivision of fields into 1x1m² soil sections used to plant crops

¹⁵ Gafun - a small embankment surrounding the hammiela, used to retain water in each hammiela whilst irrigating

field in summer, normally before the 15th August, locally considered as the end of the dry season. This was done to increase the soil fertility.

Not everyone agreed on what *il-mandra*¹⁶ was. For many it was an area of land near the farm, where to store manure or grow some herbs, vegetables for personal use and flowers. Others dumped food remains and pruned tree branches. One particular farmer used the *mandra* as a nursery for crops, to be then grown and harvested in the greenhouses.

Back then life was hard but a lot simpler. In time, as demand and competition grew, many of the interviewed farmers started converting to conventional farming to earn a better living and invested in more green houses.

6.3.3 Today's change in agriculture

Change was forced on the local farmers due to a variety of reasons including higher demand from an increased population and an increase in the number of tourists visiting these Islands, competition from farmers investing in greenhouses, monoculture, increase in farm size, and the increased consumption of chemical fertilizers and pesticides.

“Traditional techniques were lost to revolutionary agricultural equipment such as tractors, greenhouses, drip irrigation, new fertilisers and pesticides amongst others. Agriculture became immediately commercialised ... crops were being grown twice faster ... demand kept increasing, chemical industries invented new systems to spray our crops ... For the first two years this worked properly until pests and diseases became immune to these chemicals and caused much more damage.”

(Pawlu, 2010)

To top it all, farmers feel competition has increased mostly with EU accession and the introduction of the Single Market, as more and more products are imported, especially from Sicily. The majority of farmers dislike using chemical and pesticides but feel that today it is simply impossible not to spray the crops. Too much pests and diseases have managed to survive and have become immune to these pesticides, whilst new ones have been introduced through the uncontrolled importation of plants. In fact, very few farmers prepare the *mixtla*¹⁷ and use local seed as once was done. Farmers viewed their

¹⁶ Mandra - a plot of ground or farm yard found at the back of a house in a rural setting, planted with prickly pears. Sometimes it was used as a fold for sheep and other animals or simply where to dump agricultural manure

¹⁷ Mixtla - a small plant nursery where farmers used to plant the seeds which farmers kept from the previous season

concern about having to choose between maintaining their families and protecting the environment. All farmers interviewed feel that they are responsible for the protection of the environment, but they also commented that, due to induced problems, the Maltese environment is being negatively affected.

“Unfortunately not all of them (farmers in Malta who take care of the environment) some farmers are only interested in their profits at the expense of the surrounding environment ...destroying natural habitats for ever, influencing bee pollination distribution ... concentrating on using artificial methods of growing their crops for the market and that’s it ... just to sell and not to eat ... they know they are selling poison but it is their only income to support their families.”

(Martin, 2010)

6.3.4 Use of pesticides and chemicals

Most farmers are in favour of using chemical pesticides and fertilisers as, in their opinion, it is only with the use of these chemical products that they manage to grow more crops and gain more profit. However, not all farmers know the total cost involved in purchasing these chemicals. One has to consider the fact that, with a rising world oil crisis, these petroleum products will undoubtedly become more expensive. The cost to farmers interviewed for the purchase of these chemicals for one year range from €200 (Pawlu, 2010), €5,000 (Charlie, 2010) and, in one case, amounted to the exorbitant sum of €10,000 (James, 2010). They are also aware that pests become adapted to pesticide and, in time, the dose used has to be increased or changed. Many also try to use natural fertilisers bought locally, but few mentioned composting and vermin-composting.

Most of the farmers associate these chemicals with the loss of biodiversity and human illness, but cannot do without using them, even for their own needs.

“... the problem is that with the consumption of too much chemicals we are killing not only unwanted diseases but all natural insects which once attacked these pests and killed them ... like the Maltese lizard ... I used to see hundreds of them going in and out of the rubble wallstoday you can hardly see them ... they are mostly found within house gardens or in small holes along the street but not in fields”.

(Ċetta, 2010)

“Sprays to exterminate the Mole Cricket killed all creatures it came into contact with, including lizards, Bghal tax-xewka¹⁸ ... amongst others ... we used to see a lot of insects and birds feeding on them, ... both insects and birds have decreased in numbers”.

(Ġuzepp, 2010)

A small proportion of the farmers interviewed use little or no chemical pesticides at all and have their own system of farming their crops:

“I don’t agree with them (pesticides) at all ... for instance for strawberries ... I planted them in September ... sprayed once in November before covering them in tunnels and never sprayed it again ... but i keep an eye on them ... every day I check them and if I find any diseased plants I remove them at once ... according to my calculations I have removed around 50 plants but I am very happy with this ... this way it works, but unfortunately few farmers agree with this system ... in fact my neighbour sprays the fields almost every day .. which is ridiculous ... thank God my fields are far away from his and his spray does not reach my fields or if it does it is in very limited amounts ... if the government or EU is against the use of heavy use of chemicals and pesticides why do we import them in the first place?”.

(Jimmy, 2010)

All farmers agreed that pesticides and chemicals are affecting both people and the environment. The World Health Organisation states that *“By their nature, pesticides are potentially toxic to other organisms, including humans, and need to be used safely and disposed of properly”* (2009). Every pesticide bought comes with individual product labels for detailed instructions, applications, recommendations, dosage, specific safety data and other medical information. Below is a list of some pesticides imported to the Maltese Islands (Attard & Co. Ltd), together with their potential health hazard as indicated by the WHO Recommended Classification of Pesticides by Hazard (2009) (Table 6.1). The latter is denoted with the following abbreviations:

- *U - Unlikely to present acute hazard in normal use*
- *SH - Slightly Hazardous*
- *MH - Moderately Hazardous*
- *HH - Highly Hazardous*

¹⁸ Bghal tax-xewka - Large Carpenter Bee

Table 6.1 Some imported pesticides, their use, dosage and hazard classification according to WHO

Product Type	Crops	Product Use	Dose with 10 litres of water	Hazard Classification
Carbendazim	Vines, citrus fruits, vegetable crops	Curative fungicide,	5-10 ml	U
Cymoxanil & Mancozeb	Vines and tomatoes	Protective and curative fungicide	20-30 g	U
Cymoxanil & Copper	Vines, potatoes, tomatoes, melons, lettuce, artichoke and onions	Protective and curative fungicide	20-30 g	U
Dimethoate	Fruit trees, vegetable crops, tomatoes and ornamental plants - (not on figs and some peaches)	Insecticide	20 ml	MH
Cymoxanil & Famoxadone	Vines, tomatoes, potatoes, melon, marrow and cucumber	Fungicide	4 g	MH
Metribuzin	Tomatoes and potatoes	Selective weed killer	50-90 g/tumolo	MH
Indoxacarb	Apple, pear, peach, nectarine, eggplant, spinach, watermelon, cabbages	Systematic insecticide against caterpillar	1.5-2 g	MH
Sulphur	Vines, pomaci fruits, strawberries, vegetable crops, drupes, flower crops	Contact fungicide	20-60 g	SH
Cypermethrin	Vegetable crops, vines and most fruits	Short persistent insecticide	5-7 ml	MH
Copper	Vines, apples, stone fruit trees, strawberries, tomatoes, potatoes, peppers, flower fruit	Fungicide	15-25 g	MH
Dazomet	Fumigant in granular formulation for use in greenhouses and open fields	Soil disinfectant for control of fungi, weeds, insects and nematodes	40-710 g/sq m	MH
Oxamyl	Tomatoes, peppers, aubergines, cucumber, watermelons, melons	Nematocide	1 l/tumolo	MH
Chlorothalonil	Potatoes, tomatoes, mushrooms, celery, strawberries, vines, cucumbers	Fungicide	30-250 ml	U

Unfortunately not all farmers can read or care enough to always closely follow the dosage instructions. Farmers in Malta have to attend a course on the proper usage of pesticides through the MSA, however subsequent monitoring is not carried out by the regulatory bodies. The EU is in the process of endorsing the German Green representative's, Hiltrud Breyer, proposal for a directive on sustainable pesticides through the compromise process to an outcome that will phase out 22 pesticide ingredients, where she stated that this agreement is a milestone for the environment, health and consumers protection. This law will prioritise action against pesticide ingredients which cause cancer, which are mutagenic or which can harm reproductive processes, including reducing fertility or causing birth defects. It also creates a framework to define and evaluate pesticides which act as endocrine disruptors - chemicals which mimic natural hormones and can have an effect on the body at very low concentrations (Melik, 2009).

6.3.5 Market

18 out of the 26 interviewed farmers sell their produce at the *Pitkalija*, the others either sell directly to hotels, farm visitors and local food industries, export it, or sell their produce themselves around villages or along main roads. However, almost all the 26 interviewees are not happy about how the *Pitkalija* market works and the services they are offered. Many complain of corruption at the *Pitkala* and the inefficiency of this market that has no refrigerating systems and “*most of the products are kept outside, exposed to the elements and insects ... there are not enough agricultural crates and moreover these are not properly washed*” (Wenzu, 2010). Farmers are also against having the *Pitkalija* open only on Mondays and Thursdays, meaning that they (the farmers) have to spend Sunday harvesting. The restricted opening days of the *Pitkalija* also creates considerable traffic on opening days, with many going to the market at the same time, polluting the air. This road to the *Pitkalija* is severely deteriorated causing great damage to the crops in transit. Another issue raised is the illegal competition from neighbouring countries, as explained by Jimmy:

“Last month a well known local farmer (who can get away with anything, anytime) imported approximately ten tonnes of Sicilian garlic in Pitkalija crates ... 7 tonnes of them were taken to the same Pitkalija which were then sold as if they were Maltese products why do we permit these things? ..Is this fair to Maltese farmers? ... Apart from fairness and clear competition issues, such things are totally illegal to do ... he will not pay any tax but instead will take government subsidies too.”

(Jimmy, 2010)

Many believe that the old system was better - markets were decentralised and they were open every day except Sundays. Farmers could harvest their crops at the right point and sell it immediately (Ġuzepp, 2010). The *Pitkalija* is believed to be:

“outdated, both as a system and its premises. A huge restructuring is needed to increase product traceability and make it consumer-centred. Investment needs to be done on consumer requirements rather than growing crops that in previous years got a good price.”

(Leli, 2010)

6.3.6 Organic Farming

All farmers have an understanding of organic farming. Most referred to it as *“farming without the use of pesticides and artificial fertilizers”* (Ramon, 2010), *“Organic farming? I was born in it!”* (Ġanni, 2010), *“quality of the product is richer and healthier”* (Pawlu and Wenzu 2010) or *“using crop rotation”* (Jeffrey, 2010). Some even mentioned finding a balance between what is grown, natural cycles and ecosystems. 85% of farmers interviewed believe that this is the best method to use; however, they are not prepared to shift to this method as they are still engulfed in the cash crop market, at least until they receive assistance, as Ġensu explains:

“I am interested in investing in organic farming, but the local authorities need to push this concept further and give us interested farmers more assistance and support to overcome the initial hard times. It is also important to educate farmers into understanding how important this is ... quality and not quantity! Otherwise, it is not worth investing.”

(Ġensu, 2010)

Others are concerned that organic farming is no longer possible in our Islands, as there has been irrevocable damage done to the environment, soil and ecosystem: *“It is difficult to grow the crop because of pollution”* (Godfrey, 2010), and *“today, it (organic) has become very difficult because a lot of natural insects and their ecosystem have been severely affected by sprays”* (Martin, 2010). Organic is ideal, *“but there needs to be a transitional period for all this ... Government or the EU needs to find alternatives for this to happen we need to be prepared for the challenge otherwise it’s all in vain.”* (Martin, 2010)

6.3.7 The European Union

58% of the farmers interviewed have not heard of the CAP - the Common Agricultural Policy. This is in line with the findings of the Euro barometer report dated March 2010, where 81% of the Maltese people were found to have never heard or read about the CAP. Most of the farmers interviewed, however, know that the EU has regulations and aims with regard to farming but they feel there is not enough awareness on these issues.

Recently this year, an international public debate was held online through the European Commission so that the public could view their opinion on the future of the CAP (European Commission, 2010). The Maltese National Rural Network within the Ministry for Resources and Rural Affairs in Malta undertook a number of initiatives to gather the views of the various stakeholders in Malta and of the Maltese public (MRRA, 2010). This study was divided into qualitative random sampling telephone surveys, qualitative semi-structured interviews, half-day workshops and an online public debate. The main feedback gathered was the need to work together towards a more sustainable agricultural industry, improving both the quantity but especially the quality of the produce, and improve the biodiversity and ecological environments so that consumers get a good, healthy produce and farmers obtain a positive yield. However good this study may have been, it is interesting to note that no farmers' co-operatives nor individual farmers were called for the qualitative survey debate, despite the fact that they would have provided sound first-hand information. In general, the same ideas were indicated in this qualitative study, with the only difference being that most of the farmers feel that there is a lack of information disseminated to them from the responsible authorities and co-operatives. This is a very relevant issue considering the ageing farming community of our Islands who most probably are not computer literate enough to follow such information and online discussion. The same disadvantage is felt with regard to the compilation of the substantial paperwork involved in obtaining EU subsidies. Some farmers either find it too complicated (Ċensu, 2010) or at times are misguided and end up sending late applications which are then rejected (Wenzu, 2010).

It is clearly evident that *“there are a lot of good points (in the CAP) which are not practicable for Malta due to field size ... we are too small to compete with bigger countries like Italy ...”* (Martin, 2010). The same conclusion was drawn during the seminar held by the MRRA to discuss CAP post 2013 where:

“It was also pointed out that whilst the EU was presenting a common policy (i.e. the CAP) it was important that enough flexibility was retained so that the different characteristics of the different EU regions could still be catered for.”

(MRRA, 2010)

This entails a great need of investing in small scale cottage industries that work sustainably preferably through permaculture principles and tap a new niche market, both for exporting products as well as catering for eco-tourism, agri-tourism and rural tourism.

6.3.8 Local authorities

Local authorities need *“to stop writing reports after reports and start acting ... before it’s too late .. because history will repeat itself like, for instance, with the Palm weaver”* (Martin, 2010). Farmers voiced their need of having more awareness, in simple practical terms that they can understand and follow. They also mentioned the “Biedja u Sajd” journal (Agriculture and Fisheries MRRA journal, Appendix 5) which they all used to enjoy reading and learning from. These farmers stopped receiving this booklet in September 2008.

MEPA, MRRA and MSA have a list of policies in favour of sustainable farming, the protection of the environment and the promotion of healthy living. One example is the *‘Policy and Design Guidance Agriculture, farm Diversification and stables ... approved document 2007, Rural Development Plan (2004 - 2006)’*. Another is the MSA *“A consultation document on the Proposal for a Directive of the European Parliament and of the Council on machinery for pesticide application, amending Directive 2006/42/EC of 17 May 2006 on machinery”*, where they are opting towards *‘A Thematic Strategy on the Sustainable Use of Pesticides’* which aims at reducing risks to human health and the environment from pesticides. This strategy sets out five main objectives, namely:

- i. *“To minimise risks to health and the environment from the use of pesticides*
- ii. *To improve controls on the use and distribution of pesticides*
- iii. *To substitute the most dangerous pesticides with safer alternatives.*
- iv. *To encourage low-input or pesticide-free cultivation*
- v. *To establish a transparent system for reporting and monitoring progress”.*

Nonetheless farmers directly involved in this industry feel they are mocked by these authorities who *“are only after moneythey act ridiculously sometimes without even visiting the farmtoo much*

red tape ... always after the small fry but never the big fish ... it is a shame that these entities should be protecting the environment but at times end up ruining it ... recently I needed to restore a couple of roofs where I normally breed rabbits, chickens and goats -I applied for a permit with all the expenses involved - and it was refused. because they said it is outside development zone -.ridiculous!!! ... tell me how one can improve his agricultural activities in such way? ”. In 2009 MEPA informed C.Vella about a planned site visit prior to the issue of a permit for the restoration of a natural spring (Appendix 6); to date he is still waiting for such a visit. Some of the MEPA permits granting approval for restructure works at D. Mallia’s permacultural farm have not been approved on the basis of them being on an ODZ. However, only 5 meters away from this farm, permission was granted by MEPA for the developmentt of two independent schools which were built on garrigue area and agricultural land in an ODZ, and a few kilometres up the road there is a massive quarry that is used as a dumping site.

According to D. Mallia, the EU is emphasising the need to promote organic farming and farming designs through permaculture, while the MEPA and MRRA are only after making money. They are not really interested in preserving our natural heritage as:

“they perceive the farmer as an ignorant person! ... for instance there was no proper stakeholder involvement before building this school next to my farm ... they brought noise pollution and litter amongst others to an area which is surrounded by natural habitats and farming activitiesdo you call this planning?”

(Mallia, 2010)

6.3.9 Permaculture field planning

All the respondents, except for three, have never heard of permaculture. However, once explained to them they linked it to past practices. Most were interested to adopt the principles of this method and to get professional help, provided that the person giving advice is “*responsible*” and “*not interested in making personal profit at the farmers’ expense*” (Ġuzepp, 2010). Again these comments show how farmers have grown into not trusting these governing and regulatory bodies. Some farmers, however, were unsure about how economically feasible this system is since, at the end of the day, they all depend on farming for their livelihood. As Charlie puts it

“you need a lot of years to establish this system but if the MRRA helps out then this becomes much easier ... I never thought about it on these terms but it is very similar to what my ancestors used to do ... they knew their land inside out and were ready to act in

case of emergency ... they were enlightened thinkers and the result of this is this garden ... thoroughly well planned and it shows.”

(Charlie, 2010)

6.3.10 The Future

The farmers have shown concern about the way they see the future of this industry, which will “*change fast*”, better technology will be available, there will be more investment but higher prices to buy machinery and stronger chemical fertilisers and pesticides that are all derivatives of petroleum. Farmers feel that competition from countries like China will damage the Maltese market. Today’s practices will lead to an unsustainable future, as Leli puts it:

“A lot of ageing farmers will stop practising farming and their land will either be dedicated to fodder crops or to recreational uses by non-farmers. Land abandonment is already on the increase and afforestation projects are getting more importance. If farmers keep on investing in quantity production they will not sustain water resources for long, bringing dire consequences to this sector. Niche markets, product specialisation, agri-tourism, certification schemes, cultural awareness programmes and traditional revivals are all urgently needed to save Maltese farming from extinction.”

(Leli, 2010)

6.4 Departmental personnel interviews

The MRRA, MSA and MEPA were contacted by phone and email and five interviews were carried out. The aim of these interviews was to validate the scope of this research, that is analysing why few farmers try practicing agroforestry and permaculture principles in Malta in the light of the importance and emphasis that the EU is putting on the need to have sustainable farming and reduce monoculture techniques for a healthier living (as discussed in Chapter 3).

6.4.1 Farming situation on these Islands

All interviewees agreed that agriculture in the Maltese Islands needs to be taken more seriously because it is facing very difficult times due to the Single Market and competition from EU countries such as Sicily. Other problems which were mentioned include the farmers’ mistaken perception about

the CAP, farmers' unwillingness to join agricultural cooperatives for support and individualism leading to farmers' reluctance in being part of producer groups for better competitiveness. Additionally, this sector is full of ageing farmers who will sooner or later retire.

The problem with afforestation projects on the Island is that, regrettably, no or very few indigenous trees are being planted leading to the loss of the natural characteristics of these Islands. Furthermore, there is a feeling of apathy which needs to be tackled both within the Ministry and through the new generation of farmers who are investing in agri-businesses. They should be encouraged and supported in investing further in their future and find better farming solutions - hence permaculture. Some interviewees suggest a possible solution is that of diverting from monoculture activities and investing in polyculture to avoid bringing dire consequences to this sector. This will help eliminate the middleman at the *Pitaklija* market and so farmers invest in their own markets through agritourism, eco-tourism, new farmers' markets, niche markets, product specialisation, certification schemes, cultural awareness programmes and schemes for the revival of traditional farming systems. Unfortunately certain laws have to be rescinded to make way to new modern ones which better address today's circumstances "*the economies of scale in Malta and ground rent do not help new farmers to invest.*" (Interviewee 3, 2010). Another problem to be overcome is the crippling bureaucracy involved when issuing permits or applying for funds, "*...when it comes to applying for development permits with MEPA ... 10 years have passed so far ... and he is still fighting for his rights with no luck*" (Interviewee 5, 2010).

6.4.2 Which measures is Government taking to encourage farming sustainability in Malta?

Nearly all interviewees said that the most important measure which Government is taking is the establishment of a department aimed at supporting the local farming community to benefit from EU grants and subsidies through rural development schemes. These schemes encourage investment for the upgrading existing farms and the establishment of new units that favour more eco-friendly measures and are able to withstand competition from the aggressive free market system. However, according to interviewees, agritourism is being disregarded. At present the Government is also proposing and carrying out reforms within the *Pitkalija* market (see Appendix 7) and has created new farmers' markets which started to operate in October 2010. All this is being done to:

“... create economical sustainability in farming. The Government is pushing the idea of diversification of activities in farming. At the moment, MEPA application policies related with farming are being reviewed and updated to suit more the farming community.”

(Interviewee No. 3, 2010)

Farming in Malta needs to adopt new systems which are oriented towards quality and sustainability. Thus this sector needs people who are able to give the necessary support and education to farmers and villagers:

“These people need to be able to understand what are the main problems of that particular area and make the necessary analysis so the problems can be tackled there and then. There is a need for more qualified people to be engaged in this industry.”

(Interviewee, No. 4, 2010)

This is why Government encourages students to continue their studies in this sector so as to safeguard the Maltese heritage. Unfortunately some have commented that the:

“‘NEW’ farmers market has started and theoretically speaking it looks like the system will work. Unfortunately many farmers and middleman are unhappy about how this is being tackled. A lot of farmers I know have showed their concernThey can hardly cope with harvesting their crops due to lack of manpower ... they .cannot afford to spend time there every Tuesdays and Saturdayssome of them are interested in eco-tourism and agritourism and are willing to investbut authorities are reluctant in making this possible.”

(Interviewee No. 5, 2010)

6.4.3 Permaculture and Agroforestry represent a better way of farming practices. Do you think it is possible and feasible to invest in these organic systems?

Three out of the five departmental employees interviewees have argued that if Government and other involved authorities work hand in hand towards this new way of producing quality products it becomes possible, and in the long run feasible, to invest in these systems. In fact, agroforestry schemes are encouraged through national afforestation campaigns such as the 34U. Furthermore, the MRRA

has established its organic section operating under the Agricultural Directorate and through the Rural Development Plan:

“... whereby financial support is provided to organic producers. The financial aid provided is that of €600 per hectare.”

(Interviewee No. 2, 2010)

According to interviewee No. 4 permaculture principles are on the increase and are changing the Maltese landscape through the organic cultivation of olives and vines. These organic systems:

“... represent a holistic way of farming with emphasis on a sustainable approach and an ideal landscape management. This should be an eye opener to the Maltese agricultural sector, since we are very small and limited in our resources. Adopting a system which helps the farmer plan his farm to maximise efficiency and find a balance between energy input, storage and output solves a lot of problems and headaches.”

(Interviewee No. 4, 2010)

This might help reduce the nitrate problem in the water table, reduce pests and diseases which have increased through the years. Permaculture can also reduce pesticide accidents amongst farmers and their families and reduce health problems such as those caused by atrazine and malathion.

“It has been discovered that these two ingredients found in a lot of pesticides can cause deformities in animals. If I am not mistaken atrazine is banned on these Islands and malathion is constantly used. It would be ideal if all farmers manage to do without sprays but in my opinion it is very difficult to convince farmers to do without them.”

(Interviewee No. 4, 2010)

The Government needs to identify areas where permaculture can take place (an attempt to identifying some of these potential areas is included in Chapter 7). These areas should be free of heavy artificial pesticides or else Government needs to start a transition period for conversion which will take on average three years, then start applying organic policies. According to interviewee No. 5 this would become feasible only if farmers are willing to do this and they are fully supported by the authorities.

6.4.4 What control is there over imported crops, especially from Sicily?

The majority of the participants have argued that there is no control whatsoever being done on products imported from anywhere in the EU because of the single market. The only checks being done are:

“...on site, at nurseries of importers and traders to see that they have the relevant plant passports of the imported crops as part of the internal control. Obligatory national annual surveys are carried out to see if any diseases are present in Malta. Regulation EC 29/2000 is applied through L.N. 97 of 2004 by the plant quarantine section under the Plant Health Directorate. Imports from Sicily and other EU countries are considered as internal movement and not imports.”

(Interviewee No. 2, 2010)

This is totally unjust for local farmers because they can never compete with larger countries but:

“.....even if scientific studies have proved here that our local products are much tastier and better grown than foreign onesit seems that Government cannot really impose control on imports.”

(Interviewee No. 5, 2010)

6.4.5 Would you favour a project that targets investment in abandoned rural areas and their conversion to permaculture? Why?

All participants positively agreed on this scenario, the reason being that any initiative to help the agricultural sector revive is worth trying. In fact, even the Ministry itself is doing this by encouraging:

“...good agricultural and environmental conditions (GAEC) so that no agricultural land and rural areas are left abandoned. Therefore, if permaculture was to be proposed as a good practice, it would be encouraged.”

(Interviewee No. 2, 2010)

For some of the participants, the main problem is that local farmers lack certain knowledge and are unwilling to share such knowledge when this exists. This mentality undoubtedly needs to change. The problem is further compounded by the fact that the MSA is still in its infancy with regard to

conversion to permaculture and generally takes ages to process applications for such projects. As stated earlier, unfortunately this also applies to MEPA.

6.5 Foreign Experts

Two foreign experts were consulted in order to get a detached point of view of the organic projects currently taking place on these Islands. These participants are an Italian coordinator of the BIOLMED project and a Greek representative of the IFOAM involved in the Eco-Gozo project.

6.5.1 What is your opinion of the Maltese Islands and the investment in organic agriculture through EU projects?

The Italian expert feels that although investment in organic farming is still developing, the Maltese are showing more interest in this niche market. A good example is the Primo project that is endeavouring to do this through the revival of the *Bidni* variety of the olive tree which is endemic to this Island. The BIOLMED project aims to share and transfer good practices to improve the quality of the production chain of organic olive oil and its environmental impact. It is also oriented towards creating and disseminating integrated management systems of quality organic products, seeking simplification of administrative procedures and promoting their adoption, giving companies access to international markets.

Both experts feel that for this to take place in Malta and around the Mediterranean, the countries need to involve all stakeholders from day one. This will bring about a better understanding between participants and scientific institutions, together with an enhanced exchange of experiences in order to support the entrepreneurial development and the acquisition of scientific innovations. Moreover, local markets need to be set up in ideal locations to sell organic products. BIOLMED foresees the realisation of Group Purchasing Organisation and Farmers Markets models exchange, encouraging the direct purchase from small local producers, with economic benefits for both consumers and producers, as well as reduced environmental impact due to transport of goods. This is a new market model that also creates a context for the exchange of ideas and opinions.

6.5.2 Do you think it is possible to invest in permaculture techniques on these Islands to guarantee good organic farming practices?

According to the Italian interviewee, permaculture is an organized system of organic farming practices and Malta needs to have a collaboration and clear understanding between all government departments for this to take place. These need to be very efficient in order to guarantee a successful scenario. The same ideas were expressed by the Greek expert where he stated that Maltese farmers, similar to others in other EU countries, need to join together into regional zones so they minimise the effect of conventional farming on the land and natural environment. MOAM and MSA can help immensely in providing Government with the right steps to follow to convert to this farming system. He also believes that Malta has a lot of advantages since it is very small in size and farmers can concentrate on small-scale farm designs. This, however, has to be well backed by all the authorities to make it possible. Malta needs to work harder to obtain EU organic certifications, such as the Protected Designation of Origin (PDO), Protected Geographic Indication (PGI) and Traditional Speciality Guaranteed (TSG), and then start competing with other countries. Malta needs to adopt different certification schemes for its own products such as olive oil, cheeses, tomatoes, honey, prickly pears and pomegranate juice amongst others. Apart from these projects, both government personnel and local citizens need to be well educated in order to understand why and how to reach these targets.

6.6 Concluding comment

All this calls for a need of having a huge cultural shift that transects the whole Maltese population, starting with the leading administrative sectors, transcending to farmers, investors and the public at large. There should be more campaigns on the negative effects of pesticides on such a small island which is already overly populated, and it is also important to educate people not only as to what they produce but also what they eat. It is important to promote more the typical Mediterranean cuisine with a stronger emphasis on products grown locally. All this has to be integrated with a general policy on the sustainability of rural development.

Chapter 7: Conclusion and Recommendations

7.1 Purpose and direction of the study

The farming industry in Malta is facing severe challenges. Most traditional farming methods have been lost through the dependency on modern farming techniques that rely mostly on fossil fuels. Farming running costs are continuously rising and cheaper crops are being imported leading to local farmers' loss of profit. This, in turn, triggers farmers to farm their land more intensively leading to a vicious cycle which is deteriorating the Maltese environment while producing crops full of pesticides and fertilisers that negatively affect health. Many farmers feel that they have to choose between protecting the environment and feeding their families, and it has become common to have land owners selling their property to secure a lump sum rather than investing time and money in this primary sector. This scenario calls for immediate proactive action to be taken. One such step proposed in this study is the introduction of agroforestry and permaculture farming concepts. These ideas were thoroughly discussed and an in depth analysis was carried out in order to understand "Why do few farmers try practicing Agroforestry and Permaculture principles in Malta?"

In order to answer this question, open-ended, semi-structured interviews were carried out amongst a sample of local farmers, departmental representatives and two foreign experts. Having no official list of farmers due to data protection measures, a geographical cluster sample had to be identified, followed by purposive sampling that led to the identification of 26 willing respondents. The other two groups were contacted via email and telephone, and interviews were carried out with complying respondents.

7.2 Summation of the study and results achieved

7.2.1 Farmers: Most questioned farmers were male, aged between 40-49 years and owning 6-15 tumoli of land in the Northern region with the Terra Rossa soil being the most common. Young interviewed farmers could not recall traditional farming practices, while the older farmers viewed these methods as being more natural and followed nature's patterns where nothing was wasted on the farm. Few pesticides were used, mainly copper and sulphate. Considerable changes in farming

occurred through industrialisation and competition to produce more was heightened by the introduction of the Single Market. Farmers feel that they have to choose between quantity and quality to cater for the new consumer society and provide homogeneous products.

Farming today is highly dependent on chemicals, with many of these being classified amongst the WHO list of potentially hazardous substances. Many farmers complained of having suffered from irritation and/or breathing problems at one point or another. Most noted the loss of biodiversity in their fields and associate this with the continuous use of pesticides, herbicides and fungicides.

Most farmers sell their produce at the *Pitkaliġa*; however, most are not satisfied with this market because of a real or perceived high level of corruption and a low service level provided. Many farmers had a good idea of what organic farming is but were not ready to jeopardise their income to protect the environment. They were not ready to accept the concept of producing fewer, high quality products, and many showed their concern that Malta has become too polluted to shift to organic farming successfully.

Most farmers lacked knowledge about the CAP. They had a general idea that the EU provides subsidies to farmers but were not sure how this is done and where to get more information. However, most were open to suggestions. When asked what they want out of the EU, their suggestions were very similar to those of respondents in the other EU member states who participated in an international online debate and talked of sustainability, healthier products and a secure income for farmers.

Farmers are highly concerned by the lack of feedback they receive from local authorities while, at the same time, express their urge to be given more help. Policies are available but are not always rightly implemented. There is a general lack of communication between the different stakeholders which gives rise to most of the problems expressed by the farming community. There needs to be an intermediary to whom farmers can voice their opinions and cater for a bottom up approach.

Most farmers were interested in permaculture and would be willing to learn more about it. Many also commented that if they had the right backup, education and financial help, especially during the first years, they would be interested in trying this system out.

All farmers believe that the future of agriculture in Malta has to be more sustainable. Niche markets, product specialisation, agritourism, certification schemes, cultural awareness programmes and tradition revivals are all urgently needed to save Maltese farming from extinction.

7.2.2 Departmental interviewees: These agree that the local market is facing strong competition, and new sustainable practices have to be found. On the other hand, they mention the fact that many farmers do not want to learn, are reluctant to join cooperatives, and many are not prepared to deal with European terms that are new to them such as 'entrepreneurial spirit'. Having an ageing population of farmers means having the possibility of land soon becoming abandoned or used for growing fodder crops or recreational activities. Government is trying to help farmers by eliminating the middleman and proposes schemes to invest in agritourism and provides EU grants through Rural Development Schemes. It is certain that farming has to change, and this is presently being done by promoting sustainable schemes. These interviewees commented that if Permaculture and Agroforestry schemes are proved to be efficient these would definitely be implemented. However, it is interesting to note that such schemes are not listed in any policy, and do not seem to be given a high priority on the government agenda considering several quoted permit delays.

7.2.3 Foreign experts: These said that there is a need to invest more in organic projects, have a wider educational agenda and to focus on the individuality of the Maltese Islands. This has to be done through acquiring EU certifications, promote local produce and invest in agritourism.

7.2.4 Case study - permaculture farm in Mselliet: Permaculture principles are adapted to the local scenario and the named farm has been designed accordingly. The aim is to have an energy efficient small-scale farm, thus finding a balance between inputs, processes and outputs. Many positive practices are already taking place, but certain development projects are inhibited due to bureaucratic restrictions from MEPA. This goes against what the departmental interviewees stated, and is definitely a fact on which to reflect.

7.3 Concluding remarks

It is clear that farmers, government authorities and CAP all see sustainable farming practices as the way forward, but it seems that this is not being implemented properly, with local small scale farmers

being marginalized. Concluding, it is yet not clear how to succeed in bringing together all the stakeholders; however, it is certain that there needs to be a fast change in the way we perceive farming today if we want to guarantee a quality food supply and a healthy living environment in the coming years.

7.4 Recommendations

Government bodies have to lead the way into identifying potential benefits of applying agroforestry and permaculture techniques in Malta and then give the necessary feedback for these to take place. Following is a list of actions to be taken:

- A pilot study needs to be conducted, ideally through the MRRA, with a conversion plan, followed by a detailed analysis of initial pedoclimatic, structural, technical, social and economical factors and identification of priorities. Conversion times have to be defined, together with verification modes of feasibility, highlighting environmental and economical benefits. At the same time other NGOs and interested farmers are to be encouraged to manage parallel studies, so as to have a wider perspective to corroborate project viability.
- Identify potential areas that can be converted to permaculture. This includes government land patches that are not managed to their full potential, rural areas in neglect, marginal land, unattended inherited land and abandoned agricultural areas.
- Disseminate information and results of pilot study through MCAST, university, promotional campaigns, local councils and group meetings, highlighting the importance of using sustainable practices and delineating natural benefits and economic outcomes of projects.
- Participatory rural appraisal schemes where local farmers are encouraged to identify their own problems and seek possible solutions to address them based on the pilot study's practical results. Assist in implementing the project with technical advice or any other form of support. Appoint an MRRA or NGO representative who offers onsite visits and permaculture design assistance.

- Enhance communication between stakeholders. This could be achieved by using bottom up approaches, regular feedback with farmers and consumers, ideally through a decentralised system involving local councils.
- Reduce bureaucratic processes involved in converting to these programmes, with a shortening permit acquisition time.
- Promote collective work in groups to renovate ideas, reduce costs and promote regional development, market produce, packaging standards and quality labels.
- Promote locally grown products both locally and internationally as quality niche products and highlighting their potential in alternative industries such as pharmaceutical.
- Invest in eco-tourism, green tourism, and agritourism.
- Implement schemes such as eco-tax on crops grown with pesticides over crops grown organically. This will generate a greater demand for organic produce thus promoting more conversions amongst farmers.
- Government reforestation schemes, such as the 34U, should be properly managed, using local indigenous varieties and preserving the natural environment following agroforestry methods.

7.5 Final Comment

Agroforestry and permaculture are interesting, challenging and fascinating research topics due to their complexity and potential of creating a variety of multifunctional landscapes that help in improving the quality of life while reducing human impact on the ecosystems.

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Appendix 1: MEPA permits David Mallia

Director of Planning
Malta Environment and Planning Authority
St Francis Ravelin
Floriana

Our Reference: M15-PA14
Date: 26th March 2010

Dear Sir,

Re. PA:0765-07: Razzett II-Fuklar, Imselliet, Zebbiegh, I/o Mgarr

We refer to the Development Planning Application Reconsideration Report that has been issued in relation to the application in caption.

The application has been recommended for refusal.

Please find listed below the reasons that have been given for the recommendation for refusal, together with our corresponding replies to each:

1. The proposed development does not respect the requirements specified in Policy 2.8 of the Policy and Design Guidance: Agriculture, Farm Diversification and Stables in that the Policy:
 - a. seeks to locate Industrial Activity in identified industrial areas. The Site in question lies outside the Development Zone in a Rural Conservation Area.

Our client is an organic farmer and the farm is registered as an organic farm with the Malta Standards Authority.

Our client's aim is not an Industrial Activity. On the contrary, the intended activity is a Cottage Industry, which is necessary for the following reasons:

- i. grapes are grown organically and must be pressed on site.
 - ii. there is no Organic Certified Press on the island
-
- b. requires that the applicant has been registered as a wine grower with the Viticulture and Oenology unit of the Department of Agriculture, managing a registered vineyard holding for the production of 'quality wine psr' for at least two consecutive years prior to the application, and that the production process is carried out within the existing guidelines and conditions. The Department of Agriculture confirms that the applicant is not registered with the Viticulture and Oenology Unit, whilst the site is not a registered winery.

Contrary to the statements made in the report, our client is indeed registered as a vine grower and wine maker with the Viticulture and Oenology Unit of the Department of Agriculture. Please find enclosed the necessary documentation that substantiates this.

Also enclosed is a copy of the Annual Declaration of Grape Harvest as well as the Annual Declaration of Olive Harvest, issued by the Department of Viticulture and Oenology.

- c. requires that the proposed winery is not located within a site of ecological or scientific importance. The site in question falls within the limits of a scheduled site of ecological and scientific importance.

The MEPA has already indicated that the house is not located in a sensitive spot, since it approved an application for the construction of the existing house in 1997.

An area of ecological importance does exist towards the valley, a significant distance away from our proposal.

- d. requires that the total footprint of the building (excluding the existing building) does not exceed 150 square metres. The footprint of the proposed building (excluding the existing building) exceeds the allowable 150sq.m.

We suspect that the MEPA might be assessing a set of superseded plans. Our proposal falls within the 150sq.m limitation.

- 2. The proposal runs counter to Policy 2.9B of the Policy and Design Guidance: Agriculture, Farm Diversification and Stables, which does not allow for the development of new buildings for olive oil production.

As stated above, it is clear that the MEPA is not assessing the correct set of plans. Buildings for olive oil production were eliminated from our revised set of drawings submitted with our correspondence of the 2nd July 2008.

- 3. The site is located in an Area of Ecological Value as indicated on the Structure Plan Key Diagram, where further human intervention, particularly in the form proposed, is not desirable. The proposal would therefore adversely affect the area, hinder its protection and run counter to the rural conservation and ecological objectives of the structure plan.

Our proposal consists of an agricultural intervention to support agricultural use. The intervention is proposed in a paved area which is not currently used for agricultural purposes.

We wish to bring to your attention the fact that the site is adjacent to two schools with grounds, flood lights and gymnasias amongst other amenities. One cannot help comparing the difference in 'human intervention' between the two sites.

4. The proposed development conflicts with Structure Plan Policy SET 11, which does not permit urban development outside the limits of development. Since it does not comply with the provisions of the Policy and Design Guidance: Agriculture, Farm Diversification and Stables, the development is not considered to fall into a category of non-urban development which may be permitted outside existing or committed built-up area in accordance with paragraph 7.6 of the Structure Plan. The proposal also runs counter to policy BEN 5.

Our proposal is a manifestation of cottage industry, organic farming and on-site wine pressing.

There is no doubt that our client's objective is to comply with the provisions of the Policy and Design Guidance: Agriculture, Farm Diversification and Stables and that we are precisely in line with the Structure Plan Policy Set 11.

In view of the above, kindly consider our application by virtue of the good intentions of our client that are destined to compliment rural development in the spirit of the Policy and Design Guidance: Agriculture, Farm Diversification and Stables.

Yours faithfully,
spacestudio

Perit Michael Pace

c.c. Mr. David Mallia

Appendix 2: Sample transcripts of semi-structured interviews

- a) Farmers
- b) Departmental Personnel
- c) Foreign Experts

A. Farmer: Guzepp, 2010

Section A

Q1. Male

Q2. 80 years...from the age of 12 years...after school I used to go helping my father at the farm

Q3. Ahrax, Mizieb, Selmun, Mgiebah, Is-Siengha

Q4. 14 tumolos

Q5. Age of 12 years

Q6. Terra Rossa and Mixed (Terra Rossa & Carbonate Raw).....this soil has the tendency of maturing products for harvesting earlier than other types of soil (*bikri*) and products tend to get better prices

Q7 & 8. No.....never considered it

Q9 No

Section B

Q1. *Gaffun*, *Hammila* and water channels carved in upper coralline limestone

Q2. Channel systems and big reservoirs, *Is-siengha*, Chicago windmill we used on this farm back in the 70s which required maintenance frequently but if well looked after it lasted for ages...for irrigation purposes....

Q3. Well....we used to prepare our fields according to seasons.....

Q4. Example in March we used to prepare fields by ploughing the with the *talja* technique, then plant winter potatoes, cauliflower, turnip, carrots, trumpet gourds...this was done once every year for irrigated fields and four times for non-irrigated areas...so fields would be well prepared to give a proper produce (*tira*)...fields where done with what is known as *flanni* and animal manure was spread in between these *flanni* to be protected from the sun's and heat's intensity.....irrigation was planned according to the plant need for example: pumpkins used to be watered twice a week in summer...after summer that field would be prepared for lentils (*krufess*).... fifty years ago few diseases existed...most of them were natural and controlled in a natural manner....we used sulphur for pumkins, cucumber, trumpet gourds and tomatoes and copper sulphate for potatoes.....the *hammila* was used on both irrigated and non-irrigated land....channels were used to water crops and after the Second World War my father dug a borehole for a constant supply of water even in summer drought....rubble walls were used to control soil erosion and to act as a wind breaker...reeds and fig trees were also used as wind breakers...reed as always used to produce reed baskets and fig trees for

figs....in non-irrigated land we used to plant fodder, wheat, *gilbina bajda jekk gulbiena vetch*, beans, peas, onions and garlic... in irrigated vegetables such as pumpkins, turnip, trumpet gourd, cucumber, beans, lettuce...always according to seasons.... plant and leaf litter were not removed, unless these were tomatoes' and potatoes' as these tend to increase soil salt content....which would then effected future produce.

Q5. Yes, we did....my father had 2 Maltese bulls (*gendus*) which were very robust and strong....and were used for anything ...transportation of stone slabs for farm building and rubble wall building, a means of transport from home to farm to market and back again, for ploughing, for turning the water irrigation system.....

Q6. Animals such as cows were feed cotton seeds which were imported from neighbouring countries, beans, garden artichokes, corn... Bulls were fed wheat, carobs and chickpeas only after a very hard working day as a reward for their effort.

Q7. Mandra.....is a plot of small land adjacent to the farm or farmhouse where normally herbs are planted for cooking purposes....sometimes it was as a manure storage area too.

Section C

Q1 The world has totally changed from what it used to be ... after school we used to take the role of shepherds and take sheep and goats out in the countryside for grazing... we used to run after lots of birds and enjoy ourselves in natural areas... after WW II machinery was introduced and the world started changing.

Q2. I do this according to seasons.....I keep seeds from season to season to try and produce good quality Maltese vegetables... unfortunately a couple of years ago, the Reverse Osmosis management team at Cirkewwa plant decided to dig deeper into the rock so as to submerge 3 massive water pumps to pump up pollution free sea water for the plantation to convert it to potable water and have disturbed the local area ground water system.....in fact I lost all my products that year.....the same happened when *Caqnu* dug 7 illegal boreholes for the Riviera Resort in Marfa... today the water returned to almost as good as it was.....half *Caqnu's* boreholes were closed too...to irrigate I use drip type but I think the sprinkler irrigation system is much better...if well distributed along the field soil tends to retain much more moisture throughout the field and not just where the plant is located..

Q3. The majority are very well informed about the need to protect our environment but not all of us are willing to act responsibly... most of them are after money to raise their families and that's it...

Section D

Q1. Yes, I used to use pesticides....*duwa tal-buharrat* killed all creatures it came into contact with, including lizards, *bghal tax-xewk*.....amongst others.....we used to see a lot of insects and birds feeding on them, ... both insects and birds have decreased in numbers.... For example, in Comino one will find more warblers than in Malta and Gozo.....and if these birds are given time and space they will surely increase in numbers.

Q2. Used pesticides only if needed.....I am against spraying these things on vegetables.

Q3. It varies from year to year depending on the season itself....can't tell exactly

Q4. Yes, I do...I know exactly what I use on my crops and I am very cautious in producing healthy food and not food which tastes like a cocktail of pesticides.

Q5. Yes, it is... I already doyou need more time and patience.....but I prefer it this way rather than encountering any health problems related to too much use of pesticides.

Section E

Q1. At *pitkalija* market... most of the time... sometimes I do sell my products such as grapes to vineyards...and other local wine makers.

Q2. Not at all....used to earn money back in the 70s....and it was worth working in this sector.....today we are faced with too many competition.....competition is good but...it needs to be well controlled too.

Q3. I totally disagree with this... unless it is a bad year like having... severe storms, hail....the authorities shouldn't allow this... for instance if we have a lot of Maltese potatoes we should use this first and then import from EU countries when ours is almost finishing... same applies for fruit... apart from the fact that small size Maltese fruit are much tastier and better than imported ones.... the other factor which most probably influences people is the presentation of the same products in nice cardboard or plastic boxes full of colour and eye catching stuff... when I was In Australia we used to recycle cardboard to build small boxes for strawberries and peaches... I used to do the boxes myself and people used to go mad for them... a simple cardboard box!... then when we came back I adopted the same system and the same happened.. Presentation matters a lot.

Q4. *Pitkalija* market is equipped but has a lot of mishaps... for instance I take my produce at two different *pitkala*... according to the MRRA regulations there is a price fixed for every single fruit and vegetable which cannot be changed... the following week I collect my voucher and immediately notice that *pitkal* A sold them very cheap indeed while *pitkal* B gave me a reasonable price for them... is this fair?... these products are the same and were taken on the same day and both should have standard prices!... this is also seen in *xerrejja* which bargain their prices with the *pitkal* and sell it to the public around the islands for double of triple the price depending in which area you live... for instance the price for a lettuce in Sliema is €3.50 or more while in Mellieha it is €1... the worst thing is that these *xerrejja* are abusing the system by entering the market as farmers and exiting as *xerrejja*..... more enforcement is needed here.... another problem is that farmers are restricted to take their produce on only two days which is nonsense... we should have at least three days per week.

S. and what about the new market proposed by the government?

Hehe... do you think that I can afford wasting my time selling my products in an area visited mostly by farmers?... I would prefer to sell my products along the side of a road in the vicinity of a recreational area rather than staying at Ta' Qali especially in the summer heat... it doesn't make sense at all... it would be much more convenient if they opened small markets around the island and we can go there as we used to do back in the 50s and 60s.....this system might work if you are a member in a farmers' cooperative....which however I don't really trust.

Section F

Q1 Yes, I do....growing crops with minimal use of pesticides and related products....I am trying to convert part of my land to organic farming... unfortunately today there are too many problems in this sector in terms of diseases... but maybe one day they manage to control it too... what one can do is to visit the fields on a daily bases and keep an eye for the many traces of diseases and take action immediately... where fields are left fallow for decades, yes, I agree these areas can be converted to organic farming... government can help farmers to invest in this sector by explaining clearly what they should do, how they should do it and use field experts to assist farmers on the spot... help them plan ahead...

Q2. Yes...I already am in the process.

Section G

Q1. No never heard about it but I am aware of the regulations and restrictions which have been imposed on the MRRA but not the EU.

Q2. I totally agree with this....it is true that you reduce your produce and maybe profit too but after few years profits will increase again... years are all different and the atmosphere has been severely polluted... but it is still worth trying it out.

Q3. I have applied and got money from the Government for farming machinery but that's all.

Section H

Q1-4. MEPA is a disgrace.....I recently brought a couple of tractors with rubble materials to build new rubble walls to protect my soil and protect my products from occasional visitors which tend to steal from fields adjacent to the street.....they came on site with aerial photos and a report that I have damaged the garrigue area.....just to put you in the picture this rubble was dumped adjacent to the rubble wall building site and not on garrigue....a fine was issued and I had to clear all that rubble.....this is ridiculous!!....

MRRA.....should inform us farmers more clearly and thoroughly about the possibilities which we have... how to go about them...educate us...and not forget us... they should help us get EU funds in a more practical manner and not through bureaucratic processes... by the time they contact you back

on your request ... most probably you're not eligible for that money anymore... before they used to send as a very informative booklet *Biedja u Sadjja*....which I enjoyed reading when I couldn't work my fields due to weather conditions....this has been stopped too.

Section I

Q1. Yes....and I already do.

Q2. Yes I do...it will take a couple of years but its possible.

Q3. Yes...it is always worth learning about new systems so as to adopt the best one for your own farm.

Section J

Q1. Future seems hazy for this industry because of this free market thing....and it is happening at the expense of farmers.

Thanks for your time and help

Shawn Vella

SERM Student

B. Departmental personnel: Interviewee, No.3 , 2010

UNIVERSITY OF MALTA/JAMES MADISON UNIVERSITY – INTERNATIONAL MASTER’S PROGRAMME

SUSTAINABLE AGRICULTURAL MANAGEMENT AND LANDSCAPING THROUGH AGROFORESTRY AND PERMACULTURE

CASE STUDY: THE NORTH REGION OF MALTA

Departmental Interviews

Q1. What is your opinion about the current farming situation on these Islands?

Individualism leads to more problems in the farming community. Producer Organisations should merge into 1 or 2 in order to drive the market for farmers. Sales from Pos is direct, while in the Pitkali Market, the middle man restricts profit. Moreover, the economies of scale in Malta and ‘ligi tal-qbiela’ do not help the new farmers to invest.

Q2. Which measures is the government taking to encourage farming sustainability in Malta?

At present a reform in the market is being worked upon with farmer’s market, Pos, as well as the Pitkali reform that will soon be in place. This is done to create economical sustainability in farming. The goverment is pushing the idea of diversification of activities in farming .At the moment, MEPA application policies related with farming are being reviewed and updated to suit more the farming community.

Q3. Permaculture and Agroforestry represent a better way of farming practices. Do you think it is possible and feasible to invest in these organic systems?

Permaculture is increased as vines and olives are changing the Maltese rural landscape. Fields that are used for fodder crops could be converted to permaculture. Agroforestry is being catered by the Parks Division with the tree 4 U campaign. Olives should be promoted for this reason, since they are an agricultural resoure, grow faster than most trees and are Mediterranean species.

Q4. Are there any controls over imported crops, especially from Sicily?

Definitely not, as Malta is now a member of the European Union and all member states are considered as one single market. Controls are being carried out on plant issues.

Q5. Would you favour a project that targets investment in abandoned rural areas and their conversion to permaculture?

Abandoned rural areas are scarce in Malta, as land is very limited. The creation of permaculture can only grow where farmers are willing to plant trees. MEPA controls structural development and thus projects that are proposed should be in line with legal requirements.

C. Foreign Experts

UNIVERSITY OF MALTA/JAMES MADISON UNIVERSITY – INTERNATIONAL MASTER'S PROGRAMME

SUSTAINABLE AGRICULTURAL MANAGEMENT AND LANDSCAPING THROUGH AGROFORESTRY AND PERMACULTURE

CASE STUDY: THE NORTH REGION OF MALTA

Q1. What is your opinion about the Maltese Islands and the investment in organic agriculture?

I speak on behalf of the BIOLMED project.....through this project Malta has become part of a transnational network in favour of product organic olive oil. Although this is still developing i think that many Maltese are interested in this niche market. The Primo project is trying to do this through the revival of the Bidni variety which is endemic to this island and this year the trees will give their first yield after 4 years. The Biolmed project aims to share and transfer good practices to improve the quality of the production chain of organic olive oil and its environmental impact. It is also oriented towards creating and disseminating integrated management systems of quality organic products, seeking simplification of administrative procedures and promoting their adoption, allowing companies to access international markets.

For this to take place in Malta and around the Mediterranean the countries need to involve all stakeholders from day one. This will bring about a better understanding between participants and scientific institutions. This will also bring an exchange of experiences in order to support the entrepreneurial development and the acquisition of scientific innovations. Apart from this local markets will be set up in ideal places to sell organic products. Biolmed foresees the realisation of Group Purchasing Organisation and Farmers Markets models exchange, encouraging the purchase directly from small local producers, with economic benefits for consumers and producers, as well as reduced environmental impact due to transport of goods. This is a new market model that also creates a context for the exchange of ideas and opinions, especially about critical consumption and

Q2. Do you think it is possible to invest in permaculture techniques on these islands to guarantee good organic farming practices?

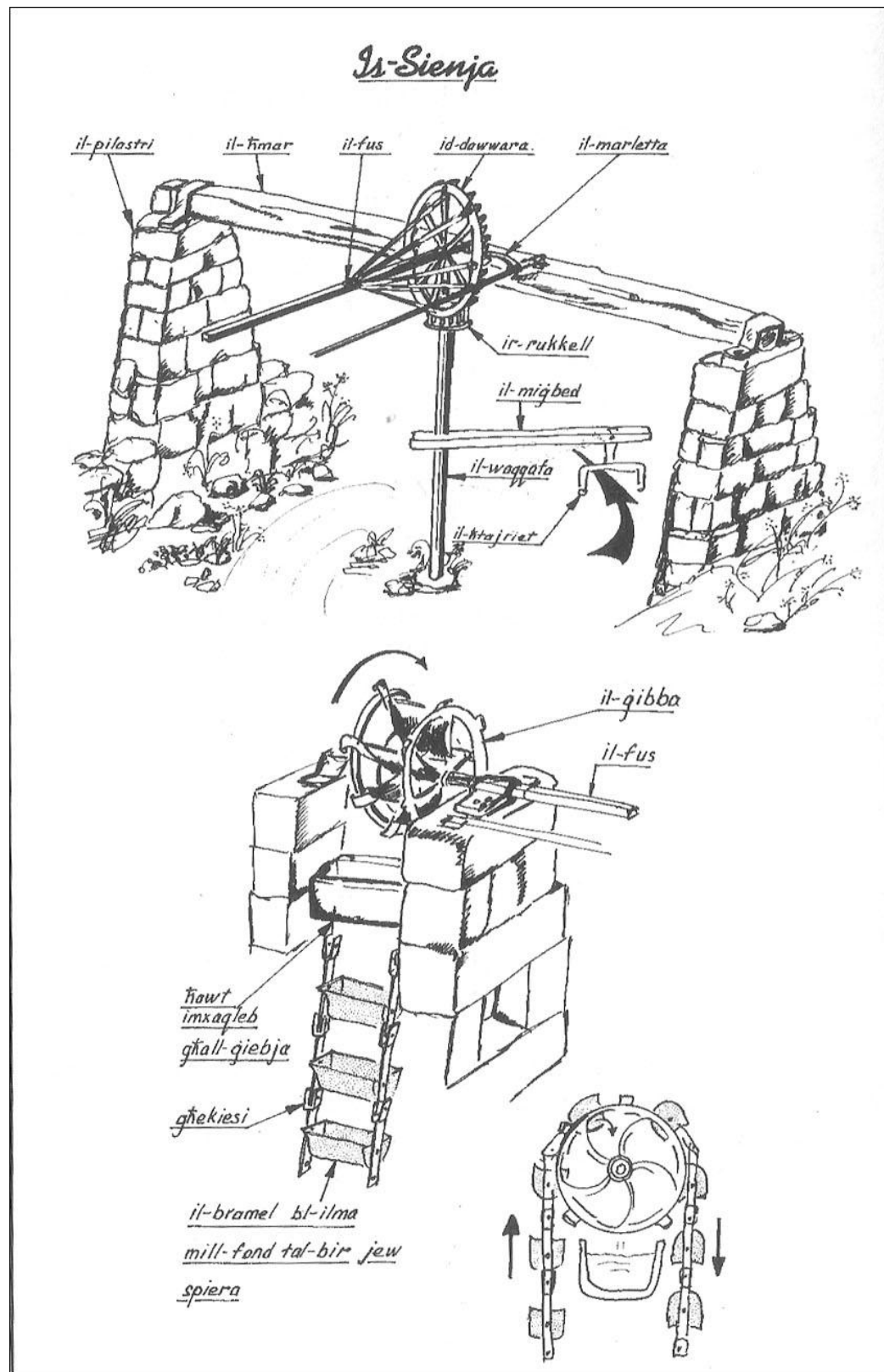
Permaculture is an organized system of organic farming practices.....if interested stakeholders manage to invest in these systems like they are doing in this Biolmed project I think yes it is possible to opt for these kind of organic techniques. I believe that there needs to be collaboration and clear understanding between all government departments for this to take place. These need to be very efficient in order to guarantee a successful scenario.

Thanks for your time and help

Shawn Vella

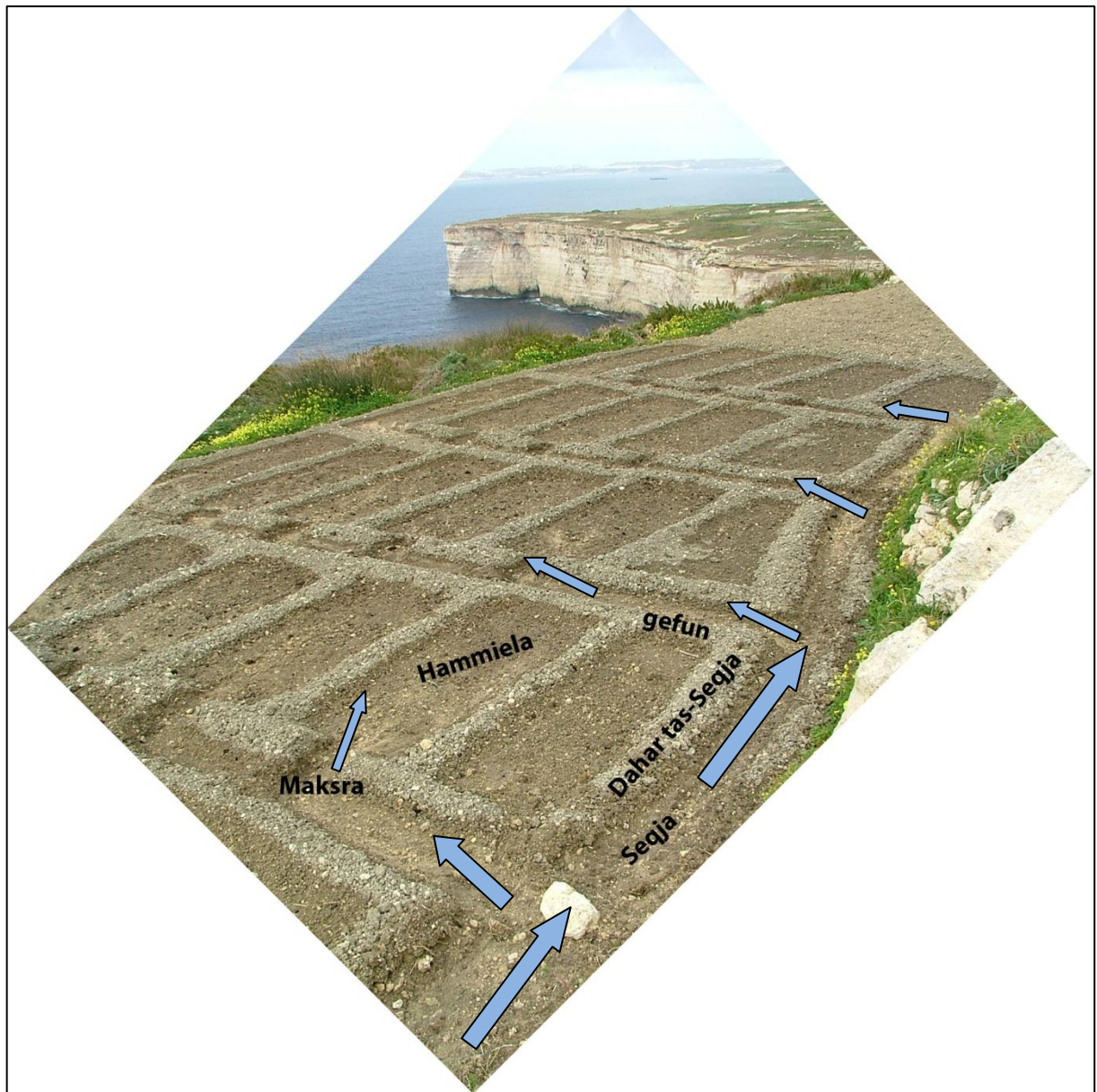
SERM Student

Appendix 3: *Sienja* – Traditional irrigation method



Source: Borg, P.,P., 2000,

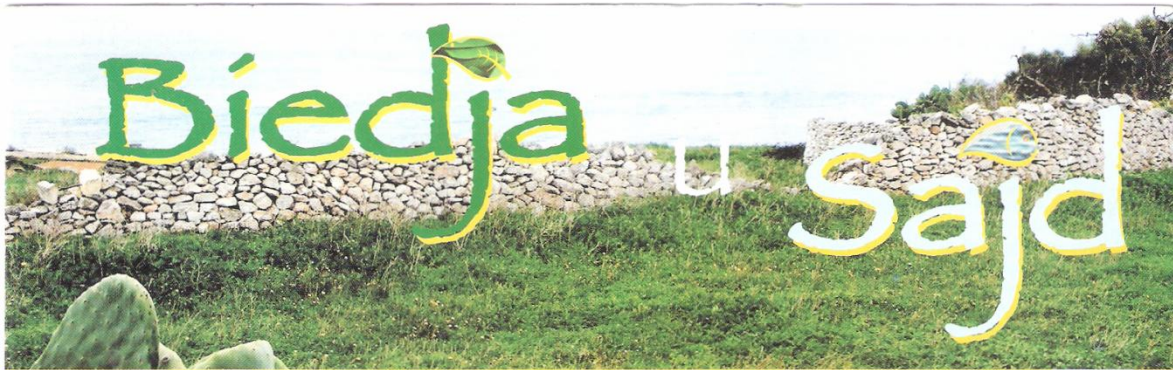
Appendix 4: *Hammiela and Gafun* – Traditional irrigation method



Water moving down the seqja (soil water channel) by gravity, and irrigating all the hammiela, with water entering the hammiela through the maksra.

(Source S.Vella)

Appendix 5: *Biedja u Sajd* Booklet



Ministeru ghar-Riżorsi u l-Affarijiet Rurali
biedjausajd.mrra@gov.mt



Il-Kwalita' ta' l-Ikel

Minn Ingrid Busuttil

Assistant Head - Direttorat għall-Affarijiet Regolatorji, Unità għal Ogġetti ta' Ikel,
Kimiċi, Pestiċidi u Kostmetiċi, Awtorità Maltija dwar l-Istandards

Meta konsumatur jixtri prodott, l-għażla tiegħu/tagħha hi kull ma jmur aktar ibbażata fuq il-kwalita' tal-prodott. Dan hu wkoll minnu fir-rigward ta' prodotti ta' l-ikel. Ma għadhiex biss kwistjoni ta' jekk l-ikel għadux tajjeb biex jittiekel iżda wkoll jekk għandhux xi toġhma speċifika jew valur nutrizzjonali għola. Ċerti prodotti għandhom ukoll valur addizzjonali peress li huma magħmulin f'reġjun partikolari jew permezz ta' metodi tradizzjonali jew peress li l-metodi ta' produzzjoni tagħhom tagħti attenzjoni speċjali għal dettalji partikolari.

F'Malta kif ukoll fil-Komunita' Ewropea hemm ammont ta' ikel li jaqta taht dawn il-kriterji. Il-problema tinholoq meta prodotti simili jippruvaw jimitaw il-prodott ġenwin u anke jieħdu l-istess isem. Meta jiġri dan il-konsumatur jiġi mqarraq, il-produttur tal-prodott ġenwin jaqta' qalbu li jkompli l-produzzjoni tiegħu u taqa' wkoll ir-reputazzjoni tal-prodott.

Fl-1992 l-Unjoni Ewropea ħolqot sistemi magħrufin bħala Denominazzjoni Protetta ta' Oriġini (DPO), Indikazzjoni Ġeografika Protetta (IGP) u Speċjalita' Tradizzjonali Garantita' (STG) sabiex tippromuovi

u tipproteġi prodotti ta' l-ikel ta' kwalita' ta' oriġini agrikola. It-tlett iskemi huma bbażati fuq l-istess principju li jipproteġu prodott ta' l-ikel partikolari

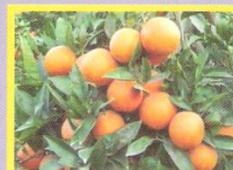
minhabba l-oriġini, metodu ta' produzzjoni u tradizzjoni.

DPO tkopri t-terminu użat sabiex jiddeskrivi ogġetti ta' l-ikel li huma prodotti, pproċessati u ppreparati f'erja ġeografika partikolari b'metodu rikonossut. Hawnhekk qeghdha tinghata enfasi speċjali lill-erja minn fejn toħroġ il-materja prima u l-proċess ta' produzzjoni. Applikazzjoni għall-prodott Malti 'Lumi Laring ta' Ghawdex' qeghdha bħalissa tiġi eżaminata mill-Kummissjoni Ewropea sabiex tibbenifika minn din l-iskema.

Fil-każ ta' IGP il-konnessjoni ġeografika trid tkun preżenti mill-anqas fi stadju wieħed ta' produzzjoni, pproċessar jew preparament. Barraminhekk, il-prodott jista' jibbenifika minn reputazzjoni tajba. Eżempju ta' prodott Malti li jista'



Il-marka ta' kwalita' DPO

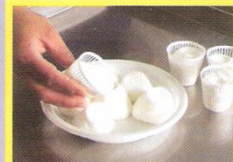


Lumi laring t'Ghawdex

jibbenifika minn din il-protezzjoni hija il-Ġbejna'. Dan il-prodott li hu magħmul mill-halib lokali tal-mogħoż u/jew nagħaġ, għandu reputazzjoni tajba li tmur lura sa minn żmien il-Kavallieri ta' San Ġwann. Il-Ġbejna' hija popolari ferm kemm mal-maltin kif ukoll ma' hafna mit-turisti li jżuru l-ġżejjer Maltin.



Il-marka ta' kwalita' IGP



Ġbejniet mill-halib tan-nagħaġ

ikompli f'paġna 3

lulju 2008 hargha nru. 204

Maltapost plc. DB
Postage Paid
Shawn Vella
16 Sawasawa
Triq J.Kepler, Kordin
Mellieha

Appendix 6: Charlie Vella MEPA permits



MALTA ENVIRONMENT & PLANNING AUTHORITY
L-AWTORITÀ TA' MALTA DWAR L-AMBJENT U L-IPPJANAR

MALTA ENVIRONMENT
& PLANNING AUTHORITY
P.O. BOX 200, VALLETTA CMR 01, MALTA
TEL: (+356 21 240 976 • FAX: (+356) 21 224 846
http://www.mepa.org.mt • email: enquiries@mepa.org.mt

Serial Number
139747

Name / Address of Applicant

*The Carmel Vella 16 Saxe saxe
J. Kapler Street Mellieħ.*

Development

*To carry out maintenance work
to an existing water gallery and
extension of water reservoir.*

Location

*Six St
Għajin Tuta
40 Mellieħ.*

		Amount
☐ Development Permit Fee (Including GDO and Minor Amendments)	☐ APS 12522930014 ☐ BOV 18603072029 ☐ HSBC Transition Code 0039	Lm 15 /
☐ Infrastructure Services Contribution (ISC)	☐ APS 12522930025 ☐ BOV 18603072016 ☐ HSBC Transition Code 0040 Main Sewer Lm Street Contribution Lm	Lm
☐ Fines	☐ APS 12522930014 ☐ BOV 18603072090 ☐ HSBC Transition Code 0070	Lm
☐ Request for Reconsideration	☐ APS 12522930014 ☐ BOV 18603072061 ☐ HSBC Transition Code 0071	Lm
☐ Commuted Parking Payment Scheme	☐ BOV 18603072126 ☐ HSBC Transition Code 0072	Lm
☐ Planning Control Fee	☐ APS 12522930014 ☐ BOV 18603072171 ☐ HSBC Transition Code 0073	Lm
☐ Appeals	☐ BOV 18603072236 ☐ HSBC Transition Code 0074 Fees for Appeal Lm Fine Lm	Lm
MEPA Office Use Only		

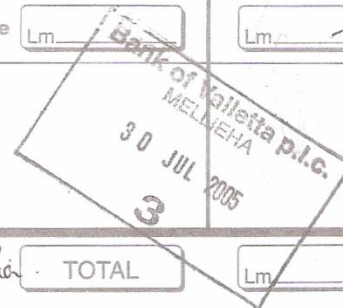
White : PA Vettors
Green : PA Accounts (DPF)
Pink : PA Accounts (ISC)
Yellow : Customer's Copy

*Copy of the original application
to indicate date.*

Carmel Vella 702955(M)

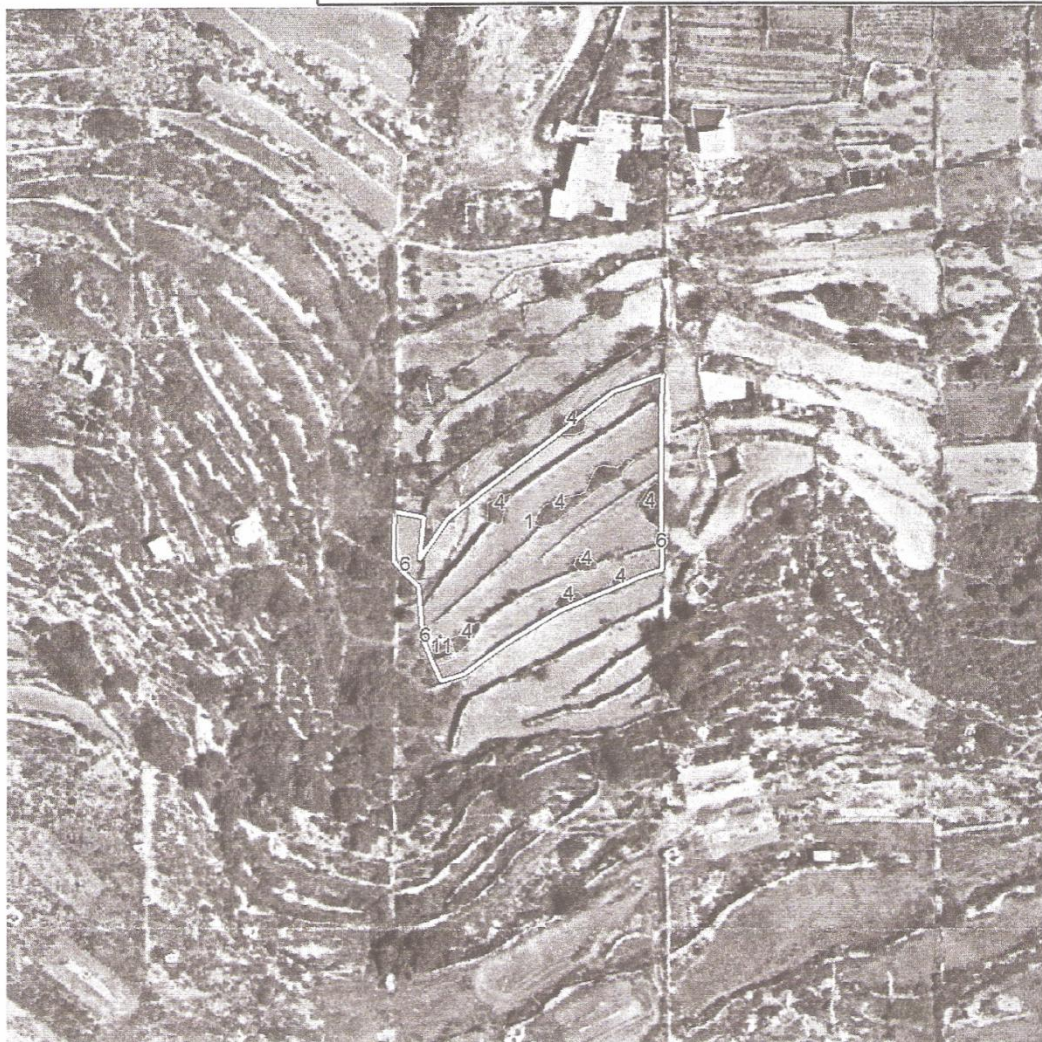
TOTAL

Lm





FRC:	MLH1005	Parcel ID:	MLH0 3881 00099			
Profile ID:	7971	Kejl Circa tal-Ghalqa	TMIEM	SIGHAN	KEJLIET	
L-isem ta' l-Ghalqa kif jafha l-bidwi:		(mhux ghal kejl ufficjali)	1	4	4	



ritratt: Orthophoto 2008 © MEPA

DETTALJI TAL-BIDWI		DETTALJI TA' L-GHALQA		UZU TA' L-ART (METRI KWADRI)	
ID No:	0702955M	VAT No.:		Numru antik:	355703
Isem:	VELLA CARMEL	ID ta' l-Ghalqa:	MLH0 3881 00099	1743	Sq. M
Indirizz:	16 SAWWA SAWWA			0	Sq. M
	TRIQ J.KEPLER	Kejl Superficjali:	0,1960 HA	0	Sq. M
	MELLIEHA		1960 Sq. M	182	Sq. M
Email:				0	Sq. M
Tel:	21523069	Pendill:	15%	0	Sq. M
Mobile:	99477614	Centru X:	39905	10	Sq. M
		Centru Y:	81601	0	Sq. M
				0	Sq. M
				25	Sq. M

Dan id-Dokument ma jaghti l-ebda dritt legali fuq il-propjeta - This document does not entitle any legal rights on the property



Mr. Carmel Vella
16, 'Sawa Sawa'
J. Kepler Street,
Mellieha
MLH 04

Date: 12 June, 2009
Our Ref: PA 05758/05
PAB Ref: 50/2009

Dear Sir/Madam,

Appeals Board Ref:	PAB 50/2009
Location:	Site at, Ghajn Tuta, I/o Mellieha
Proposal:	To carry out maintenance works to existing licensed water gallery and proposed extension to water reservoir and pumproom.

Notification of MEPA's Report to the Planning Appeals Board

Reference is made to your request for appeal, which was received on 18 March, 2009.

Please find attached herewith a copy of the report that was prepared by the Malta Environment and Planning Authority.

The Malta Environment and Planning Authority reserves the right to present further written and verbal submissions during the course of the appeal.

Should you wish to make any further written submissions, you may wish to do so by addressing your correspondence to the Secretary Appeals Board and copied to the Malta Environment and Planning Authority.

Should you have any difficulty or should you require any further details or information, please do not hesitate to contact us.

Yours faithfully,

Marthese Cassar Debono
Administrative Assistant
Post Decision Team
for Director of Planning

DocANotR

MALTA ENVIRONMENT & PLANNING AUTHORITY
L-AWTORITÀ TA' MALTA DWAR L-AMBJENT U L-IPPJANAR
P.O. BOX 200, MARSA MRS 1000, MALTA
TEL: (+356) 2290 0000 • FAX: (+356) 2290 2295
<http://www.mepa.org.mt> • email: enquiries@mepa.org.mt

Report to the Planning Appeals Board

Appeal Type:	Appeal from Refusal
Application No:	PA 5758/05
Appeal No:	PAB 50/09 ISB
Appellant:	Mr. Carmel Vella
Proposal:	To carry out maintenance works to existing licensed water gallery and proposed extension to water reservoir and pump room, at Ghajn Tuta, I/o Mellieha.

1.0 THE PROPOSAL

- 1.1 This is a full development permission application proposing maintenance works to an existing water gallery, the construction of a pump room and the construction of an extension to a water reservoir.
 - 1.2 Block plan at Red 1D indicates that the existing water gallery is partly built in compacted material and partly hewn in solid rock, having an access from the existing reservoir and having ventilation shafts at intermediate locations. The maintenance works proposed to this water gallery, involve several reconstruction measures whereby the water gallery shall be reconstructed in reinforced concrete and blockwork.
 - 1.3 The proposed alterations to the existing reservoir include extensions to its area and height, and in effect its volume. The extensions shall result in a reservoir with a height above soil level of approximately 1.5 metres, a total depth of approximately 3 metres and an area of approximately 35 sq.m. The pump room is proposed to have an area of approximately 4 sq.m. and a height above soil level of approximately 1.2 metres. Existing rubble walls on site are also proposed to be reconstructed in traditional rubble construction.
-

2.0 THE SITE

- 2.1 The site for development is located outside the development zone of Mellieha, within an area known as Ghajn Tuta. The photographs submitted with this application (attached at red 1B) indicate that the site on which works are proposed consists of a natural garigue landscape, while an aerial photograph of the area (attached at blue 16) indicates that the site's surroundings consist of cultivated agricultural land.
 - 2.2 The Local Plan designates the site within an Area of High Landscape Value and an Agricultural Area. The site is also within an area protected as:
 - a Level 3 Area of Ecological Importance acting as a buffer zone to the coastal cliffs (GN 400/96);
 - a Special Area of Conservation of International Importance due to the presence of the coastal cliffs (LN 257/03 & GN 877/03);
 - an Area of Ecological Importance / Site of Scientific Importance due to the coastal cliffs from ic-Cirkewwa to Benghajsa (GN 400/96).
-

3.0 GROUNDS FOR REFUSAL & REFUSAL NOTICE

3.1 The proposed development was refused by the DCC on 18th July 2007, and this refusal was confirmed on 4th March 2009 for a reconsideration request. The reconsideration decision notice lists the following reasons for refusal:

1. The site is located within a Special Area of Conservation of International Importance. The proposed development is not necessary to the management of the Special Area of Conservation, nor does it seek to improve the Special Area of Conservation. The proposal is therefore unacceptable as it conflicts with Article 13.1 of Legal Notice 257 of 2003.
2. The relevant site is not registered on applicant and site is not agricultural in nature but forms part of the valley system. It is therefore apparent that there is no genuine need for the proposed development, and is not considered essential to agriculture in terms of Structure Plan policy AHF 5 and RCO 2.
3. The proposal would result in an increase in the drainage of the aquifer which is considered as an unsustainable practice. The water galleries also supply other springs in the area and thus the proposal would lead to the reduction of fresh water available elsewhere, and therefore runs counter to Structure Plan policy PUT 8 which promotes the controlled aquifer recharge from surface water runoff.
4. The development would involve major engineering works that would destroy the characteristics of the site, scheduled as a Level 3 Area of Ecological Importance, a Special Area of Conservation of International Importance and an Area of Ecological Importance / Site of Scientific Importance, and would also destroy the existing water gallery which probably also has cultural heritage importance, running counter to Structure Plan policies AHF 5, RCO 2 and RCO 8.

4.0 POLICY CONTEXT

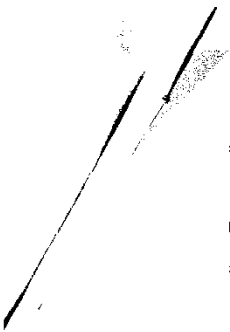
4.1 Structure Plan for the Maltese Islands (December 1990)

The strategic framework of the Structure Plan aims at using land and buildings efficiently and channelling urban development activity into existing and planned development areas, as designated through the Temporary Provision Schemes. In view of this, one of the overall goals of the Structure Plan is to maintain the distinction between urban and rural areas by limiting the spread of sporadic development. Structure Plan policies SET 11, SET 12, & RCO 2 aim at achieving this goal by prohibiting any form of urban development in the countryside, unless the development is genuinely needed for agricultural, scenic, and ecological uses.

Nevertheless, where development is intended to be carried out in the interest of agriculture, policy RCO 8 requires cultivators to demonstrate how any planned agricultural development will not harm the ecological, archaeological and scenic value of an area.

5.0 COMMENTS ON APPELLANT'S ARGUMENTS & REFUSAL NOTICE

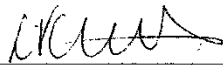
- 5.1 The proposed development has not been considered favourably by MEPA on the grounds of four main issues, being that:
- i. the relevant site is not registered on applicant;

- 
- ii. the development would involve major engineering works that would destroy the characteristics of the site and the existing water gallery, with the latter potentially being a structure of cultural heritage importance;
 - iii. the proposal would result in an increase in the drainage of the aquifer which is considered as an unsustainable practice; and
 - iv. the site is not agricultural in nature, and is located within a protected area where conservation is given precedence over agricultural practices.
- 5.2 On the first issue, the Authority was informed by the Department of Agriculture that the site subject to the proposed works is not registered on the applicant. In view of this, the Authority considered that there is no genuine need for the proposed development and hence not considered essential to agriculture in terms of Structure Plan Policy AHF 5. The appellant claims that the fields flanking the site are tilled by the applicant, and while the proposed works shall be carried out on Government Land, the Lands Department has been duly notified in this application of his intentions to carry out works on this site.
- 5.3 Notwithstanding this, the appellant's statement contradicts with the information supplied by the Department of Agriculture. In their consultation response at red 8A in the PA file, the Department stated that the applicant is registered as a part-time farmer with 4.3.6 tumoli of land, and which land is also marked on a site plan provided by this same department. When noting this site plan and the location of the proposed development, these two sites are distant by at least 240 metres, which does not tally with the appellant's statement that the applicant's land 'flanks the fields being tilled by my client'. In view of this, MEPA reiterates its position on this issue. On these same grounds, the Authority does not consider the proposed reservoir extension as justified on sound planning grounds.
- 5.4 The second issue raised concerns the potential of the existing water gallery being of cultural importance. Photographs of the water gallery were provided by the appellant (vide red 56A-E in PA file). The proposed works would involve substantial demolition of the existing water gallery and major engineering works, as the proposed maintenance involves reconstruction works by replacing the existing old structure with a reinforced concrete and blockwork structure. While the appellant indicates that these works would be carried out manually, the proposed works would require the removal of the overlying soil and compacted material, which would evidently alter the characteristics of the site.
- 5.5 Apart from the resultant loss of the existing old structure, which is not desired by the Authority, for the works to be carried out there will be irreparable damage and alterations to the natural topography and characteristics of the area. The latter is in particular not acceptable within such a sensitive area that is scheduled as an Area of Ecological Importance and a Site of Scientific Importance. MEPA considers that accepting such a proposal would be in direct conflict with Structure Plan policies AHF 5, RCO 2 & RCO 8. This position was also supported by the Environment Protection Directorate (blue 16), and both the Natural and Cultural Heritage Advisory Committees (minute 18 & black 20 respectively).
- 5.6 The proposal would also result in an increase in the drainage of the aquifer which is considered as an unsustainable practice. The water galleries also supply other springs in the area and thus the proposal would lead to the reduction of fresh water available elsewhere, as advised by the Environment Protection Directorate (blue 16). Therefore, the Authority also considers that the proposed development would also run counter to Structure Plan policy PUT 8 which promotes the controlled aquifer recharge from surface water runoff. On this issue, the appellant indicates that the proposed works are intended only to remove the existing blockages. However, the Authority does not consider this

argument as justified in view that ~~the gallery may~~ be cleaned manually and is easily accessible through the existing manholes ~~to the structure~~.

6.0 RECOMMENDATION

- 6.1 For the above-mentioned reasons, ~~the Malta Environment & Planning Authority~~ respectfully requests the Planning Appeals Board to ~~confirm the decision of the DCC and~~ to refuse this appeal for development ~~permission~~.



Lorinda Vella B.Sc. (Hons), M.A.
Appeals Section, MEPA
11th June, 2009

Copy of Original Reconsideration Notice



To: Mr. Carmel Vella
16, 'Sawa Sawa'
J. Kepler Street,
Mellieha
MLH 04

Date: 6 March, 2009
Our Ref: PA 05758/05

Application Number: PA 05758/05
Application Type: Full development permission
Date Received: 12 September, 2005

Location: Site at, Ghajn Tuta, l/o Mellieha
Proposal: To carry out maintenance works to existing licensed water gallery and proposed extension to water reservoir and pumproom.

Development Planning Act 1992 Section 33 Refusal of Development Permission

Further to the decision of refusal of the above application on 18 July, 2007 and your request for re-consideration, the Development Control Commission considered this application again on 4 March, 2009.

I regret to inform you that the Development Control Commission has confirmed its refusal of this application for the following reasons:

1. The site is located within a Special Area of Conservation of International Importance. The proposed development is not necessary to the management of the Special Area of Conservation, nor does it seek to improve the Special Area of Conservation. The proposal is therefore unacceptable as it conflicts with Article 13.1 of Legal Notice 257 of 2003.
2. The relevant site is not registered on applicant and site is not agricultural in nature but forms part of the valley system. It is therefore apparent that there is no genuine need for the proposed development, and is not considered essential to agriculture in terms of Structure Plan policy AHF 5 and RCO 2.
3. The proposal would result in an increase in the drainage of the aquifer which is considered as an unsustainable practice. The water galleries also supply other springs in the area and thus the proposal would lead to the reduction of fresh water available elsewhere, and therefore runs counter to Structure Plan policy PUT 8 which promotes the controlled aquifer recharge from surface water runoff.

PA 05758 / 05

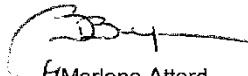
Date: 6 March, 2009

MALTA ENVIRONMENT & PLANNING AUTHORITY
L-AWTORITA' TA' MALTA DWAR L-AMBIJENT U L-IPPIANAR
P.O. BOX 200, MARSA GORDJIA, MALTA
TEL: +356 2133 0000 • FAX: +356 2133 0000

Copy of Original Reconsideration Notice

- / 4. The development would involve major engineering works that would destroy the characteristics of the site, scheduled as a Level 3 Area of Ecological Importance, a Special Area of Conservation of International Importance and an Area of Ecological Importance / Site of Scientific Importance, and would also destroy the existing water gallery which probably also has cultural heritage importance, running counter to Structure Plan policies AHF 5, RCO 2 and RCO 8.

Your right of appeal to the Appeals Board is described in the attached notes.



Marlene Attard
Head DCC Secretariat
Development Control Commission

Notes To Applicant

Right of Appeal after Reconsideration refusal

You have a right to Appeal under Section 37 of the Development Planning Act 1992 if you feel aggrieved about the decision.

Time Limits

Appeals to the Appeals Board MUST be made within 30 days of the receipt of the decision by the applicant.

Where a request for a reconsideration of a decision by the Malta Environment & Planning Authority has been made within the time limit, the 30 day period for making an appeal starts when the Authority's reply is received, and if no reply is received within 30 days, the period of 30 days for making an appeal commences.

Fees for Appeals

There is a fee to be paid, which should accompany the Appeal. The fee for an Appeal 5% of the Development Permit Fee paid in respect of the original application subject to a minimum of EUR 186.35.

Form of Requests for Appeals

Appeals should be submitted on the appropriate form, and accompanied by the fee. In addition it must be accompanied by an application containing the grounds for the appeal and the request of the appellant.

The Appeal should be either submitted by hand directly to the Planning Appeals Board Secretary, Block 2, St. Francis Ravelin, Floriana, or sent by post to Malta Environment & Planning Authority Appeals Board, PO Box 172, Marsa.

Requests for Appeals must also be accompanied by the receipts showing that the Building Levy due in respect of the application has been paid.



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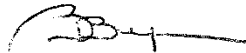
PA 05758 / 05

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<http://www.mepa.org.mt> • email: enquiries@mepa.org.mt

4. The development would involve major engineering works that would destroy the characteristics of the site, scheduled as a Level 3 Area of Ecological Importance, a Special Area of Conservation of International Importance and an Area of Ecological Importance / Site of Scientific Importance, and would also destroy the existing water gallery which probably also has cultural heritage importance, running counter to Structure Plan policies AHF 5, RCO 2 and RCO 8.

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Appendix 7: Proposed *Pitkalija* market plan

NEW PITKALI FLOW CHART

